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FINAL

Response Action Outcome Completion Report for Medical Training Facility

Westover Air Reserve Base
Massachusetts

Prepared For

Air Force Center for Environmental Excellence
Brooks Air Force Base

and

439th Support Group/ 439th Airlift Wing
Westover Air Reserve Base, Massachusetts

April 1998

PARSONS ENGINEERING SCIENCE, INC.

290 Elwood Davis Road, Suite 312 I Liverpool, New York 13088 I (315) 451-9560 fax (315) 451-9570

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PARSONS

FINAL

RESPONSE ACTION OUTCOME COMPLETION REPORT FOR MEDICAL TRAINING FACILITY WESTOVER AIR RESERVE BASE, MASSACHUSETTS

PREPARED FOR

AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE

BROOKS AFB, TEXAS

AND

439TH SUPPORT GROUP/439TH AIRLIFT WING
WESTOVER ARB, MASSACHUSETTS

PREPARED BY

PARSONS ENGINEERING SCIENCE, INC.
290 ELWOOD DAVIS RD., SUITE 312
LIVERPOOL, NEW YORK 13088

APRIL 1998

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CY to T2 ✓

PARSONS ENGINEERING SCIENCE, INC.

290 Elwood Davis Road, Suite 312 • Liverpool, New York 13088 • (315) 451-9560 • Fax (315) 451-9570

October 10, 1997

Major Ed Marchand
AFCEE/ERT
3207 North Road, Bldg. 532
Brooks AFB, TX 78235-5363

SUBJECT: Draft Final Response Action Outcome Completion Report for the Medical Training Facility site, Westover ARB, Massachusetts (Contract No. F41624-92-D-8036, Order No. 17)

Dear Major Marchand:

Please find enclosed four copies of the Draft Final Response Action Outcome Completion Report for the Medical Training Facility site at Westover Air Reserve Base (ARB), Massachusetts, prepared by Parsons Engineering Science, Inc. (Parsons ES) for the Air Force Center for Environmental Excellence (AFCEE) and Westover ARB. Copies of this draft document have also been forwarded to Mr. Paul Kwiatkowski, the Westover ARB point of contact, and Ms. Catherine Wanat of the Massachusetts Department of Environmental Protection (MADEP). Following receipt of comments from the MADEP, AFCEE and Westover ARB, the draft final document will be revised and a final version will be forwarded to you, Westover ARB, and the Massachusetts DEP.

The following responses have been prepared to address AFCEE and Westover ARB comments made to the draft report. Each AFCEE and Westover ARB comment is shown below in italics with the corresponding response below each comment.

AFCEE Comments

1) *Page 1-1, last paragraph above Section 1.3. After "(SAP) add "included in this document as Appendix A."*

   This addition has been made.

2) *Page 1-2, last paragraph above Section 1.4, third line down in that paragraph. Change "The groundwater at the site..." to "The groundwater, at an annual average depth of 40 feet bgs, at the site..."*

   This change has been made.

3) *Page 2-3, Figure 2.1. Show the approximate location of the groundwater sampling point that ECS did in 1994.*

Figure 2.1 has been revised to reflect this comment.

4) *Page 3-1, last full paragraph on the page, last two sentences. Suggest rewording to read "Drill cuttings exhibiting field evidence of contamination were contained in labeled 55-gallon drums. All other cuttings were returned to the borehole from which they were generated."*

The suggested wording was included in place of the last two sentences in the last full paragraph on Page 3-1.

5) *Page 3-5. The table lists the analytical methods used, no longer are they "Proposed" (see title of Table 3.1). The TOC is correct.*

The word "proposed" has been removed from the title of Table 3.1.

6) *Page 4-1, Section 4.2. Comment on the impact of the EPH extraction being performed outside the 7 day QA/QC limit.*

Most likely the slight exceedance in holding times did not affect the analytical results. In fact, the short EPH holding time, 7 days for this analysis, will be extended to 14 days in the final MADEP EPH method, according to the MADEP. Section 4.2 has been revised to reflect this comment.

7) *Page 4-2, Section 4.3. Would stating the size of the assumed mass source area help to emphasize the conservative nature of the calculation? (Appendix B assumes that the entire 60 feet thick by 20 feet wide aquifer source area is all contaminated to the maximum concentration).*

Section 4.3, first paragraph was revised to state that "This [the calculated equilibrium groundwater concentration of 2-methylnaphthalene] is a conservative estimate since the calculation assumes that the entire 60 feet thick by 20 feet wide source area is contaminated to the maximum concentration, and since steady-state groundwater conditions were assumed."

8) *Page 4-5, the angle boring #3 is identified incorrectly as AB-2.*

Page 4-5 was revised to correctly identify angle boring #3 as AB-3.

9) *Table 4.1 (and subsequent tables). Slide the shaded box at the bottom over to the edge to line up with the other footnotes.*

Tables 4.1 through 4.4 have been revised to reflect this comment.

Westover ARB Comments:

1) *Cover, Title Page, Page 1-1: Title should read "Response Action Outcome Completion Report for Medical Training Facility."*

   The title page and page 1-1 have been revised to reflect this comment.

2) *Page 3-1: "Decontamination fluids were collected in a large steel vessel, inspected for odor and the presence of hydrocarbon sheen, and were released to a storm sewer as directed by base personnel." We do not agree with the portion of this sentence "as directed by base personnel" and believe that it should be clarified to read that the contractor released the water to the storm sewer after determining that it was acceptable to do so in accordance with Massachusetts environmental regulations if this was the Parsons Engineering Science, Inc. process.*

   The wording of this sentence was revised to read "Cleaning fluids were collected in a small steel vessel and were inspected for odor and the presence of hydrocarbon sheen. Based on the lack of evidence of contamination, the cleaning fluids were not contained." This procedure was in accordance with the Massachusetts Department of Environmental Protection regulations.

3) *Page 5-1 in text and Page 10-1 in Appendix A: "Agawan" should read "Agwam."*

   Pages 5-1 and 10-1 have been revised to reflect this comment.

If you have any questions or comments concerning this draft final document, please contact me at (315) 451-9560 or Mr. John Ratz at (303) 831-8100.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

John M. Mastracchio
Project Engineer

Enclosure

PARSONS ENGINEERING SCIENCE, INC.

290 Elwood Davis Road, Suite 312 • Liverpool, New York 13088 • (315) 451-9560 • Fax (315) 451-9570

August 28, 1997

Major Ed Marchand
AFCEE/ERT
3207 North Road, Bldg 532
Brooks AFB, TX 78235-5363

SUBJECT: Draft Response Action Completion Report for the Medical Training Facility site, Westover ARB, Massachusetts (Contract No. F41624-92-D-8036, Order No. 17)

Dear Captain Marchand:

Please find enclosed four copies of the draft Response Action Completion Report for the Medical Training Facility site at Westover Air Reserve Base (ARB), Massachusetts, prepared by Parsons Engineering Science, Inc. (Parsons ES) for the Air Force Center for Environmental Excellence (AFCEE) and Westover ARB. Copies of this draft document have also been forwarded to Mr. Paul Kwiatkowski, the Westover ARB point of contact. Following receipt of comments from AFCEE and Westover ARB, the draft document will be revised and a draft final will be forwarded to you, Westover ARB, and the Massachusetts DEP.

If you have any questions concerning this document, please contact me at (315) 451-9560 or Mr. John Ratz at (303) 831-8100.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

John M. Mastracchio

John M. Mastracchio
Project Engineer

Enclosure

cc: File 726876.35110
John Ratz (Parsons ES, Denver)

To: John Ratz @ Parden
From: EDWARD MARCHAND@ERT
Cc:
Bcc:
Subject: Westover MTF Draft Response Action Completion Report Comments
Attachment:
Date: 9/15/97 1:43 PM

John, here are my comments on the report:

1) Page 1-1, last paragraph above section 1.3. After "(SAP)" add "included in this document as Appendix A."

2) Page 1-2, last paragraph above section 1.4, third line down in that paragraph. Change "The groundwater at the site...." to "The groundwater, at an annual average depth of 40 feet bgs, at the site..."

3) Page 2-3, Figure 2.1. Show the approximate location of the groundwater sampling point that ECS did in 1994.

4) Page 3-1, last full paragraph on page, last two sentences. Suggest rewording to "Drill cuttings exhibiting field evidence of contamination were contained in labeled 55-gallon drums. All other cuttings were returned to the borehole from which they were generated."

5) Page 3-5. The Table lists the analytical methods used, no longer are they "Proposed" (see title of Table 3.1) The TOC is correct.

6) Page 4-1, section 4.2. Comment on the impact of the EPH extraction being performed outside the 7 day QA/QC limit.

7) Page 4-2, section 4.3. Would stating the size of the assumed mass source area help to emphasize the conservative nature of the calculation? (Appendix B assumes that the entire 60' thick aquifer by 20 ' wide source area is all contaminated to the maximum concentration)

8) Page 4-5, the angle boring # 3 is identified incorrectly as AB-2.

9) Table 4.1 (and subsequent tables). Slide the shaded box at the bottom over to the edge to line up with the other footnotes.

That's all I have.

Ed

SECTION 1

INTRODUCTION

1.1 PURPOSE

This Response Action Outcome Completion Report has been prepared for the US Air Force Center for Environmental Excellence (AFCEE) at Brooks Air Force Base (AFB), Texas; and Westover Air Reserve Base (ARB), Massachusetts. The report is intended to support site closure for vadose zone soils impacted by #2 fuel oil in the immediate vicinity of a former underground storage tank (UST) at the Medical Training Facility Site at Westover ARB.

1.2 PROJECT BACKGROUND

In October 1994 during construction of a new Medical Training Facility, the Army Corps of Engineers uncovered an abandoned 2,000-gallon underground #2 fuel oil storage tank. The tank was removed on November 2, 1994, and petroleum hydrocarbon contaminated soil was encountered below the tank. This event prompted an Immediate Response Action (IRA), and the Massachusetts Department of Environmental Protection (MADEP) assigned a Release Tracking Number (#1-10588) to the site.

As part of the Response Action, the MTF site was selected as a pilot test site for the AFCEE-sponsored Extended Bioventing Project. The Extended Bioventing Project is a follow-on contract to the AFCEE Bioventing Pilot Test Initiative project, which included more than 100 *in situ* bioventing pilot tests at 46 Air Force installations nationwide. These tests were designed to collect data on the effectiveness of bioventing for the remediation of vadose zone soils contaminated with fuel hydrocarbons (e.g., JP-4 jet fuel, diesel fuel, gasoline, and heating oil).

The 1-year bioventing pilot test at the MTF was completed in August 1996. The purpose of the pilot test was to evaluate the effectiveness of bioventing in remediating unsaturated soils contaminated with petroleum hydrocarbons thought to have resulted from heating oil released from the former UST. Based on the results of the extended bioventing test, *in situ* bioventing appears to have reduced petroleum hydrocarbon contamination in site soils sufficiently to meet MADEP requirements for closure of the site.

In April 1997, a Closure Sampling and Analysis Plan (SAP), included in this document as Appendix A, was prepared for the MTF. The confirmatory soil sampling effort was performed in May 1997 as part of the AFCEE Extended Bioventing project (Contract No. F41624-92-D-8036, Order 17).

1.3 REGULATORY FRAMEWORK

The objective of the confirmatory soil sampling is to support a Response Action Outcome Statement recommendation for the soil impacted by fuel oil near the MTF at Westover ARB, Massachusetts. Response Action Outcomes (RAOs) are the end points of all response actions under the Massachusetts Contingency Plan. The Response Action Outcome Statement documents that the site has reached an end-point.

Risk characterization was used in the Massachusetts Contingency Plan to document that a level of no significant risk of harm to health, safety or the environment has been achieved for the site. The risks for the MTF were characterized via Method 1, comparing promulgated lists of soil and groundwater action levels to contaminant concentrations detected at the site. In order to compare site conditions to appropriate soil and groundwater action levels, the soil and groundwater at the site was categorized based on its accessibility, the age of potential receptors at the site, the frequency at which the receptors visit the location and the nature of the activities that occur at the location. Groundwater was categorized based on its current and/or future use as drinking water, its potential to act as a source of volatile material to indoor air, and its potential to discharge material to surface water.

The soil at the MTF has been classified into category S-3 because the impacted soil is isolated (greater than 15 feet below the ground surface and under the footprint of a building). The groundwater, present at an annual average depth of 40 feet below ground surface (bgs) at the site, has been classified into category GW-3, a potential source of discharge to surface water. In the SAP, the soil action levels were reported based on groundwater classified as G-1, within a potential drinking water source area. However, recent revisions to the Massachusetts Contingency Plan exclude airport areas, such as Westover ARB, from the G-1 classification. Subsequently, the groundwater at the MTF is excluded from category G-2 because the average annual depth to groundwater at the MTF is not less than 15 feet, indicating that the groundwater is not considered to be a potential source of vapors to indoor air. A summary of the Massachusetts Department of Environmental Protection (MADEP) Method 1 Standards for category S-3 soils and GW-3 groundwater is included in Tables 4.1 through 4.4 presented in Section 4 of this document.

1.4 SUMMARY OF CONFIRMATORY SAMPLING RESULTS

BTEX and polyaromatic hydrocarbon compounds in the soil samples collected from near the former UST excavation were detected either below the method detection limit or above the method detection limit but below MADEP Method 1 Standards. VPH/EPH aliphatic and aromatic carbon chain groups were detected below MADEP Method 1 Standards, except in one sample, that contained C9-C10 aromatics at a concentration that slightly exceeded MADEP Method 1 Standard for C9-C10 Aromatics. Total petroleum hydrocarbon (TPH) concentrations were below the Method 1 Standard in all of the vertical boring samples, but exceeded the Method 1 Standard in 4 of the 6 angle boring samples.

The average exposure point concentrations were calculated based on the arithmetic average concentration of three samples exhibiting the highest total EPH/VPH concentrations. The resulting average exposure point concentrations of EPH/VPH, BTEX and PAH compounds were all below the Method 1 Standard.

Based on the site conditions and a comparison of average exposure point concentrations to MADEP Method 1 Standards, a level of no significant risk exists at the MTF site. As a result, a Class A-2 RAO is recommended.

1.5 REPORT ORGANIZATION

This Response Action Completion Report consists of five sections, including this introduction, and four appendices. Section 2 includes a brief site description and history. Section 3 is a description of the confirmation soil sampling activities conducted at the site. Section 4 contains a summary of confirmation sampling analytical results and a recommendation for closure of vadose zone soils in the vicinity of the former UST. References used in preparation of this study are provided in Section 5.

Appendix A provides the response to comments on the draft final report. Appendix B presents a copy of the Confirmatory Soil Sampling and Analysis Plan (SAP) which includes a detailed summary of previous site investigations. Appendix C provides a copy of the borehole logs, and Appendix D presents laboratory analytical data.

SECTION 2

SITE DESCRIPTION AND HISTORY

2.1 SITE LOCATION AND HISTORY

The Medical Training Facility (MTF), located in the central portion of the base between Niagara and Walker streets, was constructed in 1994 and 1995. During construction of the new facility, the Army Corps of Engineers uncovered an abandoned 2000-gallon underground #2 fuel oil storage tank within the new building foot print. The tank was removed on November 2, 1994 and petroleum hydrocarbon contaminated soil was encountered below the tank. The source of contamination is suspected to be a result of a historic spill. The locations of the MTF, the former UST, and the extent of petroleum hydrocarbon contaminated soil are shown on Figure 2.1.

2.2 SITE GEOLOGY AND HYDROLOGY

Soils above the water table consist of fine sand with a trace of silt to a depth of at least 30 feet bgs. Fine to coarse sand with a trace of gravel exists beneath the fine sand layer to at least 42 feet bgs. Groundwater is encountered at a depth of approximately 40 feet bgs and apparently flows in a westerly direction. A detailed description of the MTF geology and hydrogeology is provided in the SAP (Appendix B).

2.3 PREVIOUS INVESTIGATIONS

2.3.1 Site Groundwater

Groundwater at the MTF site was assessed during a site investigation conducted by Environmental Compliance Services, Inc. (ECS) in November 1994. Three groundwater samples were collected from temporary monitoring wells located near the former UST location, as shown in Figure 2.1. Results indicated that VOCs and TPH were below the method detection limits in all samples collected from the site.

2.3.2 Site Soil

In December 1994, Tighe and Bond, Inc. advanced four soil borings to the groundwater table within the new building footprint in order to delineate the extent of soil contamination. Soil samples collected from near the former UST excavation exhibited total petroleum hydrocarbon (TPH) concentrations above 10,000 mg/kg. The maximum detected TPH concentration (18,000 mg/kg) was detected in soil boring B-1, collected at a depth of between 15 and 17 feet below ground surface (bgs).

In April 1995, during the remediation system installation, Parsons Engineering Science, Inc.(Parsons ES) collected six soil samples from near the former UST excavation. Two of the six soil samples collected exhibited TPH concentrations above 5,000 mg/kg. The maximum detected concentration (8,650 mg/kg) was collected from soil boring VW,

located southwest of the building foundation at a depth of 14 to 16 feet bgs. A more detailed description of previous investigations is included in the SAP (Appendix B).

2.4 REMEDIATION ACTIVITIES

In April 1995, a pilot scale bioventing system was installed in the MTF area by Parsons ES as part of the Air Force Center for Environmental Excellence (AFCEE) Extended Bioventing Project (Contract No. F41624-92-R-8036, Order 17). During installation, respiration and air permeability testing and soil and soil gas sampling were performed. Analytical results from the soil gas sampling and respiration testing indicated that significant reductions in TPH and BTEX compounds had taken place with the estimated 30- to 40-foot radius of the vent well (VW). A detailed description of the bioventing remediation activities is included in the SAP (Appendix B).

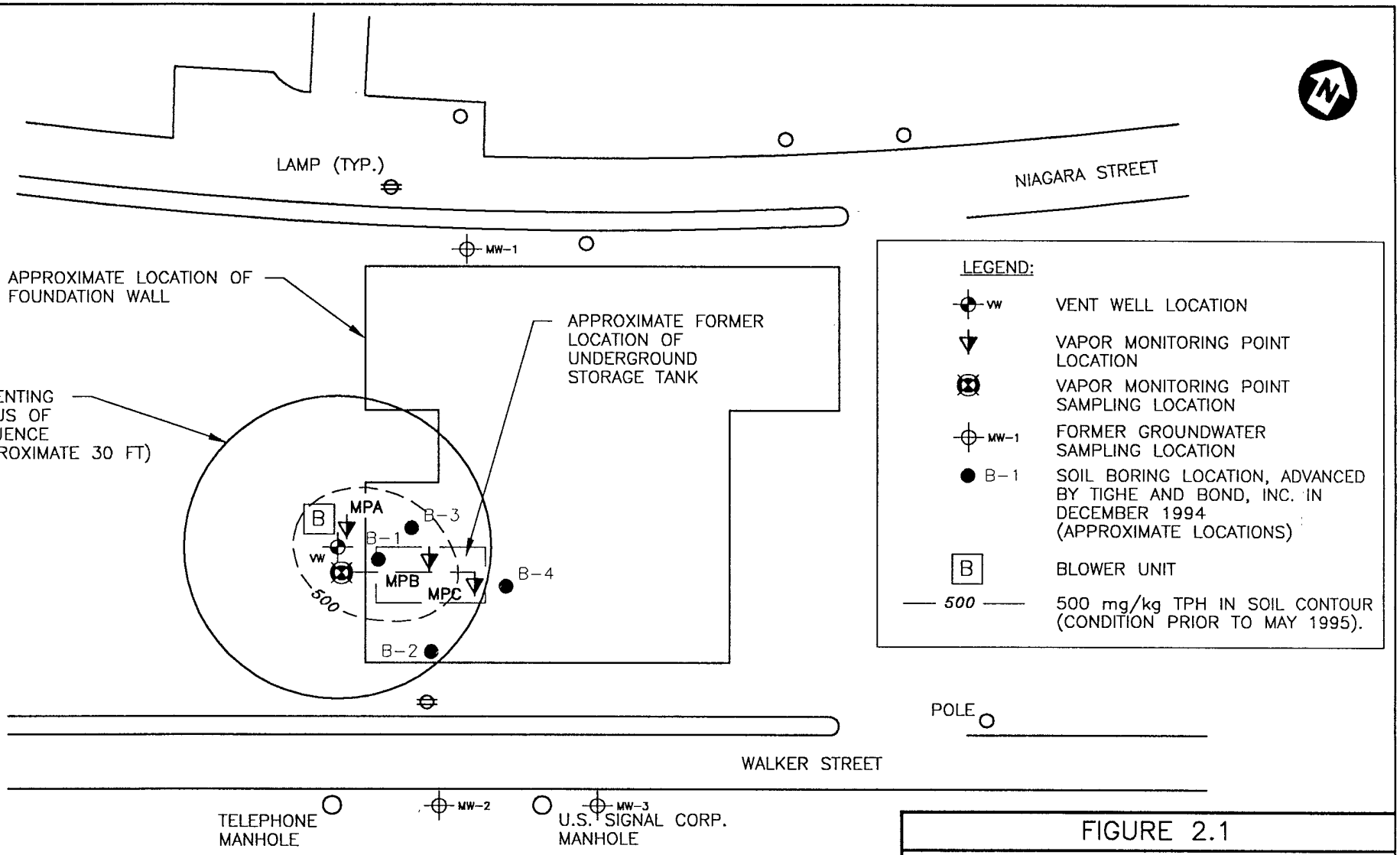

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FIGURE 2.1

WESTOVER AIR RESERVE BASE
MASSACHUSETTS

SITE LOCATION AND AS-BUILT BIOVENTING SYSTEM SCHEMATIC MEDICAL TRAINING FACILITY

PARSONS ENGINEERING SCIENCE, INC.
DESIGN * RESEARCH * PLANNING
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OFFICES IN PRINCIPAL CITIES

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SECTION 3

SITE CLOSURE SAMPLING AND ANALYSIS ACTIVITIES

The following section describes the sampling locations and depths, soil sampling procedures, and analytical methods used during the investigation of MTF site soils to support site closure. These methods and procedures are described in the closure SAP for the MTF (Appendix B). The closure SAP was implemented by qualified Parsons ES scientists and technicians trained in the conduct of soil sampling, records documentation, and chain-of-custody procedures. Environmental sample analyses were performed by Inchcape Testing Services (ITS), an AFCEE approved laboratory.

3.1 SAMPLING METHODOLOGY

3.1.1 Sample Matrices

Twelve subsurface soil samples were collected from 3 vertical and 3 angle boreholes installed during the site investigation. The purpose of the angle drilling was to collect soil samples from beneath the MTF foundation near the former UST excavation.

3.1.2 Investigation Methods

Three vertical and three angle boreholes were installed at the MTF between 19 May 1997 and 23 May 1997. The boreholes were advanced using a drill rig equipped with the capability of drilling in the vertical position and at an angle to the ground surface. Vertical boreholes were installed to the groundwater table at approximately 40 feet below the ground surface, and outside of the MTF building foundation. Angled boreholes were installed beneath the building foundation by setting the drill rig mast at an angle between 45 and 50 degrees from the horizontal. Angle borings AB-1 and AB-3 were installed at an angle of 50 degrees and AB-2 was installed at an angle of 45 degrees, based on site conditions. All drilling was performed using 4.25-inch inside-diameter (ID) hollow-stem augers. Each borehole was logged by a Parsons ES field engineer. Borehole logs are included in Appendix C.

The downhole equipment was cleaned before use and between boreholes to prevent the potential for cross-contamination. Cleaning was accomplished using a high pressure hot water wash, followed by a potable water rinse. Cleaning fluids were collected in a small steel vessel and were inspected for odor and the presence of hydrocarbon sheen. Based on the lack of evidence of contamination, the cleaning fluids were not contained. Drill cuttings exhibiting field evidence of contamination were contained in labeled 55-gallon drums. All other cuttings were returned to the borehole from which they were generated.

Soil samples were collected continuously from each boring, beginning 15 feet bgs and continuing to the bottom of each boring. Lithologic descriptions of the soil samples were performed in the field by a Parsons ES field engineer. In addition, each soil sample was

visually inspected for evidence of petroleum hydrocarbons and screened with a photoionization detector (PID). Soil samples exhibiting staining, odor or elevated PID headspace readings were sent to a laboratory for analysis. Two samples from each borehole were analyzed. In addition, one background sample was collected in an area southeast of the MTF site.

Soil samples were packed in ice and were placed in an ice chest for shipment. A chain-of-custody form was completed and the ice chest was shipped to Inchcape Testing Services in Colchester, Vermont.

3.1.3 Sample Locations

The three vertical and three angled boreholes were drilled and sampled at the MTF site in the locations shown on Figure 3.1. The vertical boreholes were drilled on the southwest side of the MTF building, approximately 4.5 feet from the building foundation. The angle boreholes were installed beginning approximately 13 feet away from the south side of the building foundation, and were completed between 27 and 31 feet below grade. Based on the angle that the borehole was installed, each borehole was completed approximately 10 to 15 feet within the building foundation.

Soil samples were collected continuously from the vertical borings beginning 15 feet bgs and continuing to the bottom of each boring. Soil samples collected for laboratory analysis included the 15 to 17 foot and 21 to 23 foot bgs intervals in soil boring B-1, the 29 to 31 foot and 37 to 39 foot bgs intervals in vertical boring B-2, and the 31 to 33 foot and 35 to 37 foot bgs in vertical boring B-3. These samples exhibited the highest apparent contamination based on visual inspection and PID readings. Visual observations and PID readings are included on the boring logs presented in Appendix C.

Soil samples were also collected continuously from the angle borings beginning 15 feet bgs and continuing to the bottom of each boring. Soil samples collected for laboratory analysis included the 18 to 19 foot and 25 to 27 foot intervals in angle boring AB-1, the 20 to 21 foot and 27 to 28 foot intervals in AB-2, and the 23 to 25 foot and 29 to 31 foot intervals in AB-3.

In addition, one background soil sample was collected in an area southeast of the MTF site to be used for a baseline comparison with the other soil samples collected from near the former UST area. This sample was collected at a depth interval of 2 to 4 feet using a hand auger.

3.2 SAMPLE ANALYSIS

The 6 soil samples collected from the vertical borings and the 6 soil samples collected from the angle borings were analyzed for TPH by USEPA Method 418.1, BTEX by USEPA Method SW8020A, and PAHs by USEPA Method SW8310. In addition, three of the angled boring samples (AB-1 at 18 to 19 feet bgs, AB-2 at 27 to 28 feet bgs and AB-3 at 29 to 31 feet bgs) and two of the vertical boring samples (B-1 at 21 to 23 feet bgs and B-2 at 29 to 31 feet bgs) were analyzed for volatile petroleum hydrocarbons (VPH) and

extractable petroleum hydrocarbons (EPH) by USEPA Method SW8015 Modified. The background sample (BAK-2-4) was analyzed for TPH, VPH and EPH.

Quality control (QC) samples were collected and analyzed to assess field and laboratory methods. QC samples include a trip blank, a field duplicate (B2-37-39DUP), and a matrix spike/matrix spike duplicate. The soil sampling analytical methods and detection limits are presented in Table 3.1.

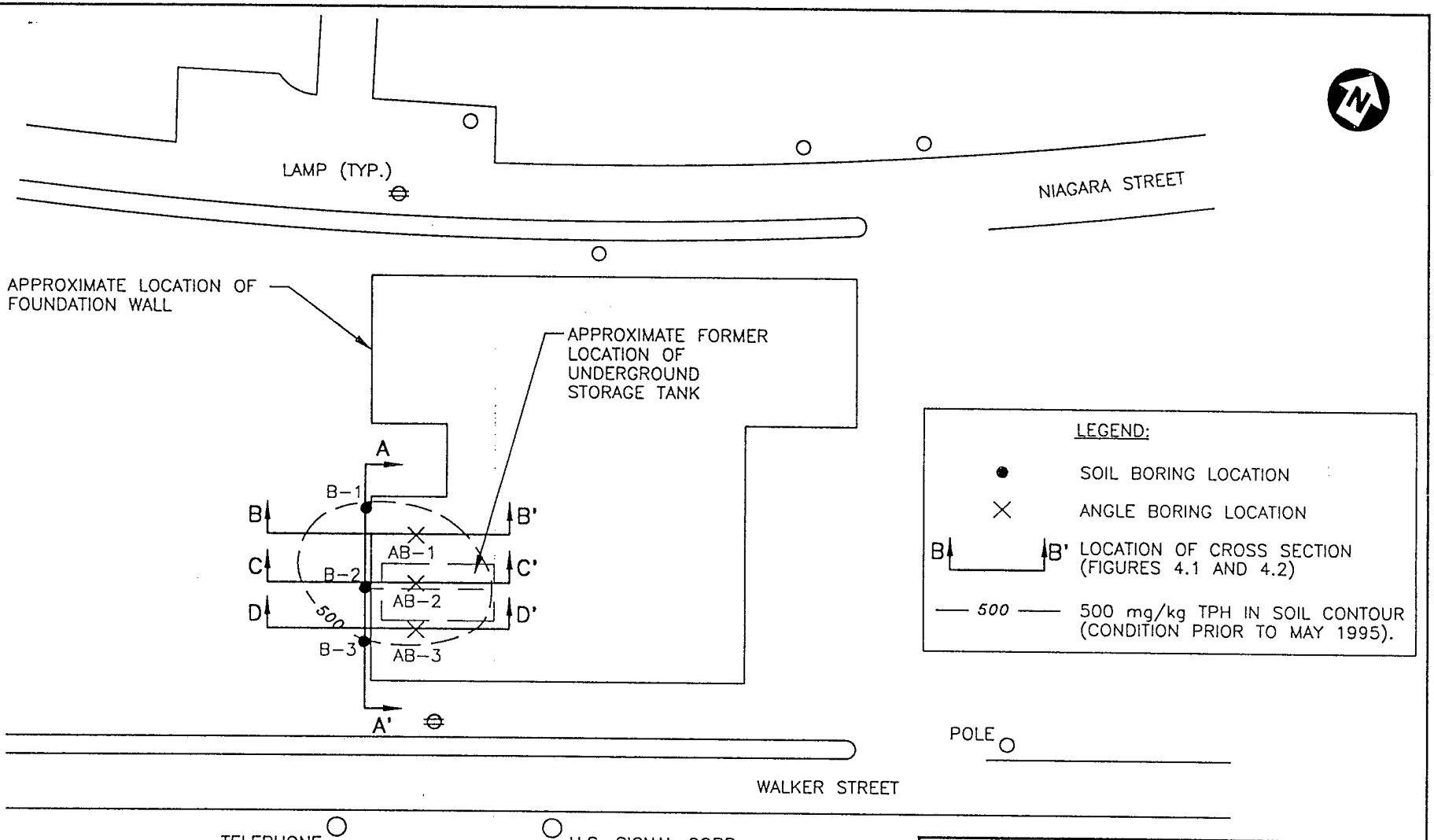

FIGURE 3.1

WESTOVER AIR RESERVE BASE
MASSACHUSETTS

CONFIRMATORY
SOIL SAMPLING LOCATIONS
MEDICAL TRAINING FACILITY

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TABLE 3.1
Soil Sample Analytical Methods,
Practical Quantitation Limits, and Number of Samples
Medical Training Facility Site
Westover Air Reserve Base, Massachusetts

Analyte	Number of Samples[a\]	Detection Limit (ug/kg)
USEPA Method 418.1		
Total Recoverable Petroleum Hydrocarbons	12	10
USEPA Method 8015 (Modified)		
Volatile Petroleum Hydrocarbons (VPH)	5	10
Extractable Petroleum Hydrocarbons (EPH)	5	10
USEPA Method 8020A		
Volatile Organics		
Benzene	12	1
Chlorobenzene	12	2
1,2-Dichlorobenzene	12	4
1,3-Dichlorobenzene	12	4
1,4-Dichlorobenzene	12	3
Ethylbenzene	12	2
Toluene	12	2
Xylenes (total)	12	2
USEPA Method 8310		
Polyaromatic Hydrocarbons		
Acenaphthene	12	1.2
Acenaphthylene	12	1.54
Anthracene	12	0.44
Benzo (a) anthracene	12	0.009
Benzo (b) fluoranthene	12	0.012
Benzo (k) fluoranthene	12	0.05
Benzo (ghi) perylene	12	0.011
Benzo (a) pyrene	12	0.015
Chrysene	12	0.1
Dibenz (a,h) anthracene	12	0.02
Fluroanthene	12	0.14
Fluorene	12	0.14
Indeno (1,2,3-cd) pyrene	12	0.03
Naphthalene	12	1.2
Phenanthrene	12	0.42
Pyrene	12	0.18

a\ Excludes QC samples.

SECTION 4
METHOD 1 RISK CHARACTERIZATION RESULTS

This section summarizes the analytical results from the confirmatory soil sampling conducted at the MTF and compares these results to MADEP Method 1 Standards. This section also identifies the exposure point and exposure point concentrations, evaluates reasonably foreseeable site activity and use, and characterizes risk of harm to safety. Recommendations for the site are presented based on the results of the confirmatory soil sampling analysis and the site risk characterization.

4.1 FIELD SCREENING RESULTS

Lithologic descriptions of the soil samples were performed in the field by a Parsons ES field engineer. Each soil sample collected was also visually inspected for evidence of petroleum hydrocarbons and screened with a photoionization detector (PID). Cross sections of site soils are presented on Figures 4.1 and 4.2. Results of the field screening are included on the borehole logs presented in Appendix C.

4.2 LABORATORY RESULTS

The complete soil analytical results from Inchcape Testing Services (ITS) are presented in Appendix D, and a summary of the results are presented in Tables 4.1 through 4.4. A total of 14 soil samples, including one field duplicate and one background sample, were collected at the MTF site and submitted for laboratory analysis. The 7 soil samples collected from the vertical borings (including the field duplicate) and the 6 soil samples collected from the angle borings were analyzed for TPH, BTEX and PAHs. In addition, three of the angled boring samples (AB-1 at 18 to 19 feet bgs, AB-2 at 27-28 feet bgs and AB-3 at 29 to 31 feet bgs) and two of the vertical boring samples (B-1 at 21 to 23 feet bgs and B-2 at 29 to 31 feet bgs) were also analyzed for VPH and EPH. The background sample (BAK-2-4) was analyzed for TPH, VPH and EPH. Two soil samples with the highest field PID screening results were submitted for laboratory analysis.

Total BTEX in the angle borings collected from beneath the building foundation was detected below the method detection limit in 4 of the 6 samples analyzed. BTEX was detected at a concentration of 3.7 mg/kg in AB-2 at 27-28 feet bgs and 13.2 mg/kg in AB-3 at 29 to 31 feet bgs. Total BTEX in the vertical borings was detected below the method detection limit in 2 of the 7 samples analyzed. Total BTEX in the vertical borings was detected at a maximum concentration of 0.1 mg/kg in B-2 at 29 to 31 feet bgs. All BTEX compounds were detected below MADEP Method 1 Standards for all samples that were analyzed.

All vertical and angle boring samples analyzed for polyaromatic compounds via EPA Method 8310 were detected below MADEP Method 1 Standards. All samples analyzed for polyaromatic compounds via VPH/EPH Method 8015 (modified) were also detected below MADEP Method 1 Standards.

Total petroleum hydrocarbon (TPH) concentrations were below the MADEP action level of 5,000 mg/kg in all of the vertical boring samples, but exceeded the MADEP action level in 4 of the 6 angle boring samples. The maximum TPH concentration was detected at AB-2 at 29 to 31 feet bgs at a concentration of 15,300 mg/kg. In addition, TPH concentrations exceeded the Method 1 UCL in 2 samples.

All vertical and angle boring samples analyzed for VPH/EPH aliphatic and aromatic carbon chain groups were detected below MADEP Method 1 Standards, except for one sample, AB-2 at 29 to 31 feet bgs. This sample slightly exceeded MADEP Method 1 Standard of 500 mg/kg for one carbon chain group, C9-C10 Aromatics (detected at 580 mg/kg). However, none of the concentrations of aliphatic and aromatic hydrocarbon fractions exceeded the Upper Concentration Limits (UCLs).

The laboratory reported that two samples received on May 23,1997 (AB1-23-25 and AB3-38-40) were extracted outside of the established holding time for EPH analysis. The MADEP EPH method holding time of 7 days was exceeded by 6 to 7 days. The EPH analytical results from these soil samples will remain in the report as possible EPH soil concentrations and are noted as having exceeded the holding time.

4.3 IDENTIFICATION OF EXPOSURE POINT AND EXPOSURE POINT CONCENTRATIONS

The soil at the MTF has been classified into category S-3 because the impacted soil is "isolated" (greater than 15 feet below the ground surface and under the footprint of a building). The exposure point consists of approximately 275 cubic feet of soil located beneath the MTF. The exposure point extent consists of an area 30 feet long, 25 feet wide and 10 feet deep (from 18 to 28 feet below grade). The exposure point extent is shown on Figure 4.4.

An average exposure point concentration for the MTF site was calculated based on the arithmetic average concentration of three of the angle boring samples collected beneath the MTF building. The resulting average concentrations provide a conservative estimate of the concentration which could potentially be contacted by a receptor at the exposure point over a period of exposure. These three sample results were selected to be included in the average exposure point concentration because they represent the highest total EPH/VPH concentrations detected in confirmatory soil samples. The resulting average exposure point concentrations are presented on Table 4.5.

The average exposure point concentrations of EPH/VPH, BTEX and PAH compounds were all below the Method 1 Standard. Based on the site conditions and a comparison of average exposure point concentrations to MADEP Method 1 Standards, a level of no significant risk exists at the MTF site. According to the MCP, a condition of no significant risk of harm to health, public welfare and the environment exists if the exposure point concentrations of VPH/EPH fractions comprising the TPH are less than or equal to the Method 1 Standard (310 CMR 40.0973).

4.4 EVALUATION OF REASONABLY FORSEEABLE SITE ACTIVITY AND USE

The MTF site is located at Westover Air Reserve Base. Current activities at the site include the use of the MTF building for offices and medical training purposes, and use of the parking lot in front of the building for parking and for ROTC training activities. Recreational and leisure activities have not been known to occur at the site, but are possible. Westover Air Reserve Base is restricted to military personnel and civilians with business on the base. Therefore, it is not likely for small children to be present at the site.

Westover Air Reserve Base will remain a military base for the reasonably foreseeable future. No additional construction activities are planned in the near future in the vicinity of the site. Any possible future construction activities at the site would not likely result in contact with exposure point soil because this soil is located at a depth of greater than 15 feet below grade and is isolated beneath a building foundation.

The ground surface in front of the MTF building supports plant life and may support wildlife. Shrubs and grass have been planted in front of the building. Due to the depth of the exposure point soil, there is minimal risk of harm to plant life or to forging wildlife.

4.5 CHARACTERIZATION OF RISK OF HARM TO SAFETY

The conditions at the MTF site, which are related to the past release of petroleum constituents, due not currently and will not in the foreseeable future pose a threat of physical harm or bodily injury to people. The remaining petroleum constituents in soil are present at a depth of greater than 15 feet below grade, the impacted area is overlain by a building foundation, the residual petroleum constituents are not known to exhibit characteristics of corrosivity, reactivity, flammability, or explosivity, and no surface features exist at the site that, as a result of the past release, would do physical harm or bodily injury to people.

4.6 FEASIBILITY OF ACHIEVING BACKGROUND CONCENTRATIONS

Many of the more readily biodegradable compounds at the MTF site have been significantly reduced as a result of bioventing treatment. However, bioventing effectiveness generally reaches an asymptotic limit when the most readily biodegradable compounds are degraded and the more recalcitrant compounds remain. Therefore, further bioventing treatment of the soil to achieve background concentration is considered unfeasible.

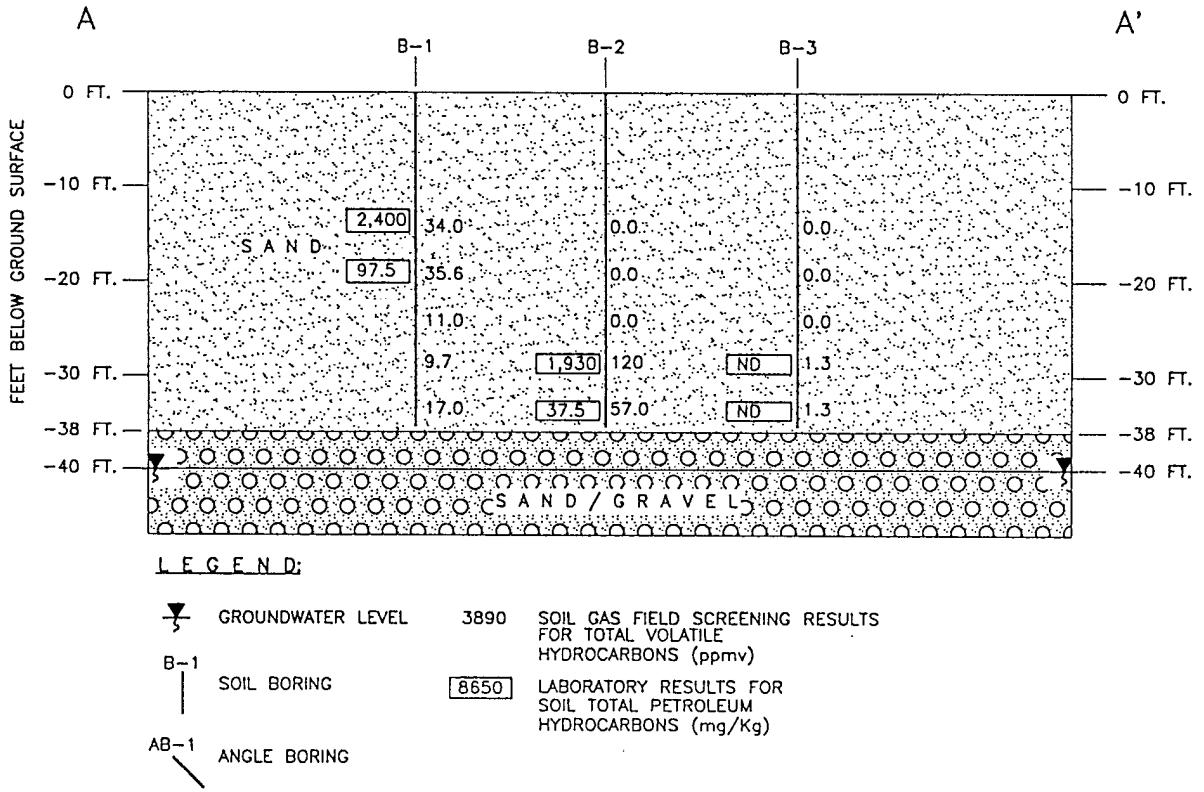
In addition, other methods of achieving background concentrations, such as soil excavation, are considered unfeasible because the impacted soil is located beneath the foundation of a building at a depth of greater than 15 feet below grade.

4.7 RECOMMENDATIONS

Based on the confirmatory soil analytical results summarized in Tables 4.1 through 4.5, existing site conditions, evaluation of reasonably foreseeable future activities, and

characterization of risk of harm to safety, a Class A-2 Response Action Outcome (RAO) is recommended for the MTF.

Once closure of the MTF site has been approved by the MADEP, it is recommended that the bioventing system be dismantled and removed from the site, and that the VW and MPs be properly abandoned in accordance with well abandonment procedures outlined in the Massachusetts Contingency Plan.



20' 10' 0 20'

Approximate Scale in Feet

FIGURE 4.1

WESTOVER AIR RESERVE BASE
MASSACHUSETTS

GEOLOGIC PROFILE A–A'
MEDICAL TRAINING FACILITY

PARSONS ENGINEERING SCIENCE, INC.
DESIGN • RESEARCH • PLANNING
290 ELWOOD DAVIS ROAD • SUITE 312 • LIVERPOOL, N.Y. 13088 • 315/451-9560
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REVISED DATE: 07/16/97 (JHG)
Xref. or Views: View: SEC-AA-10XP
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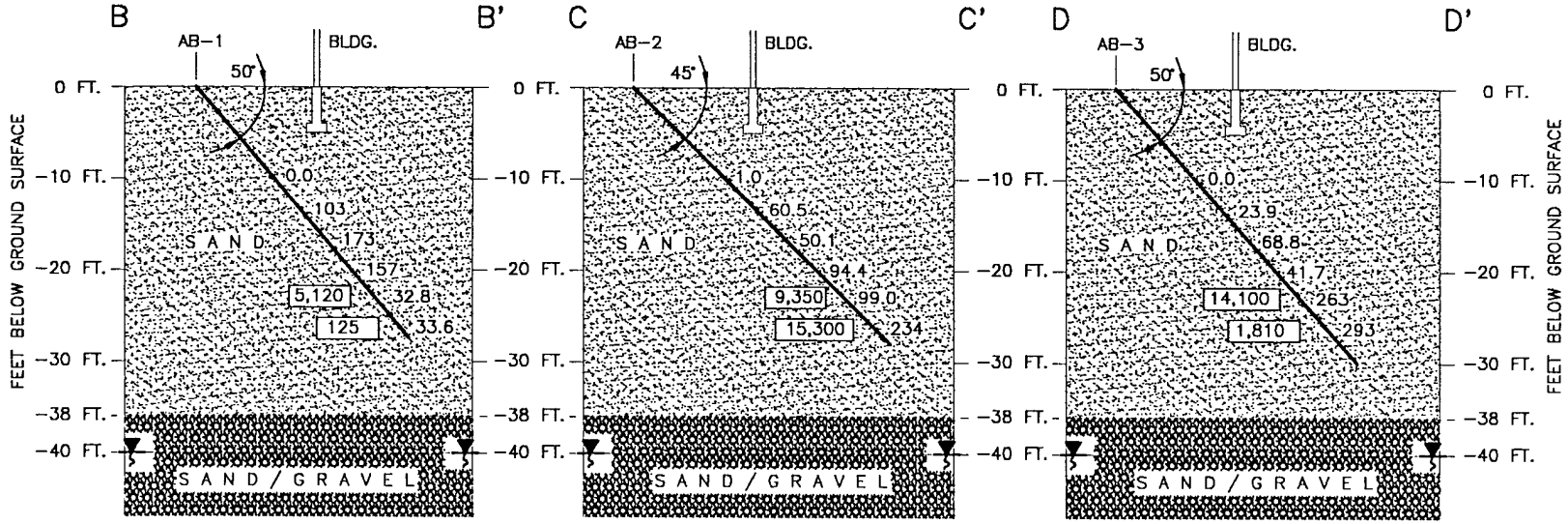

LEGEND:

- GROUNDWATER LEVEL
- B-1 SOIL BORING
- AB-1 ANGLE BORING
- 3890 SOIL GAS FIELD SCREENING RESULTS FOR TOTAL VOLATILE HYDROCARBONS (ppmv)
- 8650 LABORATORY RESULTS FOR SOIL TOTAL PETROLEUM HYDROCARBONS (mg/Kg)

20' 10' 0 20'

Approximate Scale in Feet

REVISED DATE: 07/16/97 (JHG)
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FIGURE 4.2

WESTOVER AIR RESERVE BASE
MASSACHUSETTS

GEOLOGIC PROFILES B-B', C-C', AND D-D' MEDICAL TRAINING FACILITY

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DESIGN * RESEARCH * PLANNING
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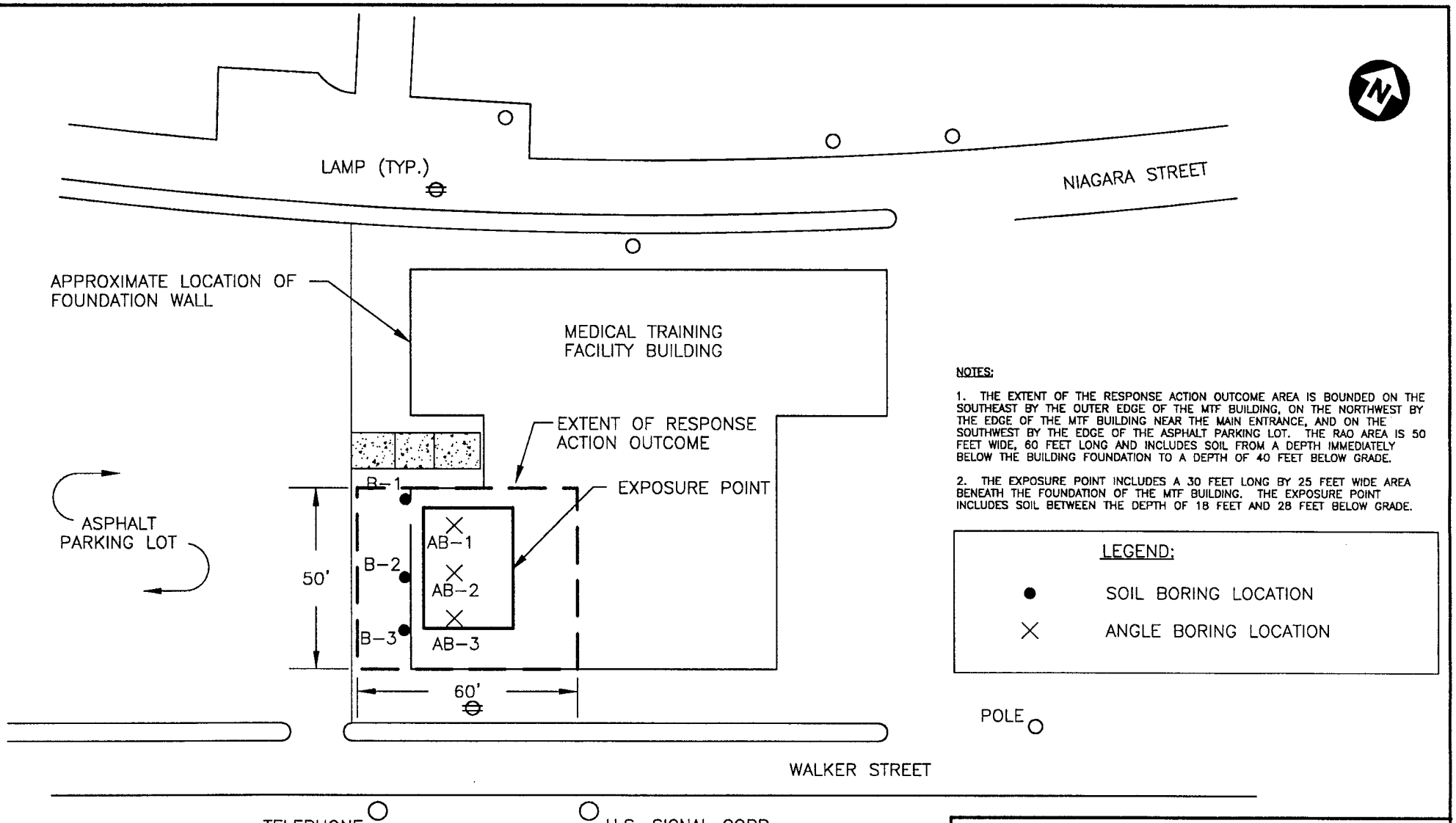

NOTES:

1. THE EXTENT OF THE RESPONSE ACTION OUTCOME AREA IS BOUNDED ON THE SOUTHEAST BY THE OUTER EDGE OF THE MTF BUILDING, ON THE NORTHWEST BY THE EDGE OF THE MTF BUILDING NEAR THE MAIN ENTRANCE, AND ON THE SOUTHWEST BY THE EDGE OF THE ASPHALT PARKING LOT. THE RAO AREA IS 50 FEET WIDE, 60 FEET LONG AND INCLUDES SOIL FROM A DEPTH IMMEDIATELY BELOW THE BUILDING FOUNDATION TO A DEPTH OF 40 FEET BELOW GRADE.

2. THE EXPOSURE POINT INCLUDES A 30 FEET LONG BY 25 FEET WIDE AREA BENEATH THE FOUNDATION OF THE MTF BUILDING. THE EXPOSURE POINT INCLUDES SOIL BETWEEN THE DEPTH OF 18 FEET AND 28 FEET BELOW GRADE.

LEGEND:

● SOIL BORING LOCATION

× ANGLE BORING LOCATION

NOT TO SCALE

FIGURE 4.3

WESTOVER AIR RESERVE BASE
MASSACHUSETTS

RESPONSE ACTION OUTCOME LOCATION MAP MEDICAL TRAINING FACILITY

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REVISED DATE: 04/03/98 (JAR)
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TABLE 4.1
Soil Analytical Results For EPH/VPH
Collected From Vertical Soil Borings
Medical Training Facility Site
Westover Air Reserve Base, Massachusetts

Location			B1-21-23	B2-29-31	BAK[a]
Depth Below Grade (ft.)	Upper Conc.	Method 1	21-23	29-31	2-4
Units	Limits (mg/kg)	tandards[b] (mg/kg	(mg/kg)	(mg/kg)	(mg/kg)
Analyte					
USEPA Method 8015 (Modified)					
Total Volatile Petroleum Hydrocarbons (VPH)[c]	NA	NA	12	42	<0.01
Total Extractable Petroleum Hydrocarbons (EPH)[d]	NA	NA	0.11	0.25	<0.01
C5-C8 Aliphatics (actual conc.)[e]	5,000	500	0.19	0.77	<0.15
C5-C8 (toxicity conc.)[f]	NA	NA	0.10	0.4	<0.08
C9-C12 Aliphatics (actual conc.)	20,000	5,000	18	160	<0.15
C9-C12 (toxicity conc.)	NA	NA	0.9	8	<0.01
C9-C10 Aromatics (actual conc.)	5,000	500	11	34	<0.15
C9-C10 (toxicity conc.)	NA	NA	11	34	<0.15
C9-C18 Aliphatics (actual conc.)	20,000	5,000	47	290	<0.31
C9-C18 (toxicity conc.)	NA	NA	2.4	14	<0.16
C19-C36 Aliphatics (actual conc.)	20,000	5,000	4.7	34	<4.2
C19-C36 (toxicity conc.)	NA	NA	0.02	0.2	<0.02
C11-C22 Aromatics (actual conc.)	10,000	5,000	110	240	<8.8
C11-C22 (toxicity conc.)	NA	NA	110	240	<8.8
Volatile Petroleum Hydrocarbons					
Benzene	2,000	200	<0.10	<0.40	<0.08
Ethylbenzene	10,000	500	<0.10	<0.40	<0.08
Toluene	10,000	2,500	<0.30	<1.10	<0.23
Xylenes (total)	10,000	2,500	<0.60	<2.10	<0.46
Methyl tert-Butyl Ether	5,000	200	<0.30	<1.10	<0.23
Polyaromatic Hydrocarbons					
Acenaphthene	10,000	4,000	<0.59	3.2	<0.52
Acenaphthylene	10,000	1,000	<0.59	5.8	<0.52
Anthracene	10,000	5,000	<0.59	<2.6	<0.52
Benzo (a) anthracene	100	4	<0.59	<2.6	<0.52
Benzo (a) pyrene	100	0.7	<0.59	<2.6	<0.52
Benzo (b) fluoranthene	100	4	<0.59	<2.6	<0.52
Benzo (k) fluoranthene	400	40	<0.59	<2.6	<0.52
Benzo (ghi) perylene	10,000	2,500	<0.59	<2.6	<0.52
Chrysene	400	40	<0.59	<2.6	<0.52
Dibenz (a,h) anthracene	100	0.8	<0.59	<2.6	<0.52
Fluorene	10,000	4,000	<0.59	<2.6	<0.52
Fluroanthene	10,000	1,000	<0.59	<2.6	<0.52
Indeno (1,2,3-cd) pyrene	100	4	<0.59	<2.6	<0.52
2-Methylnaphthalene	10,000	1,000	<0.59	17	<0.52
Naphthalene	10,000	1,000	<0.59	<2.6	<0.52
Phenanthrene	10,000	100	<0.59	4.6	<0.52
Pyrene	10,000	5,000	<0.59	<2.6	<0.52

[a] The background sample was collected southeast of the MTF site.
[b] MADEP Method 1 Standards are based on soil category S-3 and groundwater category GW-3 values documented in the revisions to the Massachusetts Contingency Plan (310 CMR 40), effective October 31,1997.
[c] VPH value is the sum of the toxicologically-weighted values of C5-C8, C9-C12 (aliphatics) and C9-C10 (Aromatics)
[d] EPH value is the sum of the toxicologically-weighted values of C9-C18, C19-C36 (aliphatics) and C10-C22 (Aromatics)
[e] Reported concentration excludes BTEX and MTBE concentrations.
[f] The toxicity concentration is the toxicologically-weighted value for the hydrocarbon range of interest.
- Concentration exceeds Method 1 Standard.

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TABLE 4.2
Soil Analytical Results For EPH/VPH
Collected From Angle Soil Borings
Medical Training Facility Site
Westover Air Reserve Base, Massachusetts

Location			AB1-23-25	AB2-38-40	AB3-38-40
Boring Angle (degrees from horizontal)			50	45	50
Depth Below Grade (ft.)	Upper Conc.	Method 1	18-19	27-28	29-31
Units	Limits (mg/kg)	Standards[a] (mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Analyte					
USEPA Method 8015 (Modified)					
Total Volatile Petroleum Hydrocarbons (VPH)[b]	NA	NA	210	650	100
Total Extractable Petroleum Hydrocarbons (EPH)[c]	NA	NA	0.48	3.6	0.84
C5-C8 Aliphatics (actual conc.)[d]	5,000	500	0.79	15	0.97
C5-C8 (toxicity conc.)[e]	NA	NA	0.40	7.5	0.49
C9-C12 Aliphatics (actual conc.)	20,000	5,000	330	1,200	180
C9-C12 (toxicity conc.)	NA	NA	16.5	60	9.0
C9-C10 Aromatics (actual conc.)	5,000	500	190	580	94
C9-C10 (toxicity conc.)	NA	NA	190	580	94
C9-C18 Aliphatics (actual conc.)	20,000	5,000	2000*	3,800	710*
C9-C18 (toxicity conc.)	NA	NA	100	190	36
C19-C36 Aliphatics (actual conc.)	20,000	5,000	110*	210	43*
C19-C36 (toxicity conc.)	NA	NA	0.55	1.1	0.2
C11-C22 Aromatics (actual conc.)	10,000	5,000	380*	3,400	800*
C11-C22 (toxicity conc.)	NA	NA	380	3,400	800
Volatile Petroleum Hydrocarbons					
Benzene	2,000	200	<0.35	<0.52	<0.23
Ethylbenzene	10,000	500	<0.35	<0.52	<0.23
Toluene	10,000	2,500	<1.1	<1.6	<0.69
Xylenes (total)	10,000	2,500	<2.1	<5.1	<1.38
Methyl tert-Butyl Ether	5,000	200	<1.1	<1.6	<0.69
Polyaromatic Hydrocarbons					
Acenaphthene	10,000	4,000	3.6	45	7.8
Acenaphthylene	10,000	1,000	4.5	40	8.8
Anthracene	10,000	5,000	<2.8	<13	<2.7
Benzo (a) anthracene	100	4	<2.8	<13	<2.7
Benzo (a) pyrene	100	0.7	<2.8	<13	<2.7
Benzo (b) fluoranthene	100	4	<2.8	<13	<2.7
Benzo (k) fluoranthene	400	40	<2.8	<13	<2.7
Benzo (ghi) perylene	10,000	2,500	<2.8	<13	<2.7
Chrysene	400	40	<2.8	<13	<2.7
Dibenz (a,h) anthracene	100	0.8	<2.8	<13	<2.7
Fluorene	10,000	4,000	4.3	28	3.7
Fluroanthene	10,000	1,000	<2.8	<13	<2.7
Indeno (1,2,3-cd) pyrene	100	4	<2.8	<13	<2.7
2-Methylnaphthalene	10,000	1,000	16	180	31
Naphthalene	10,000	1,000	<2.8	32	3.9
Phenanthrene	10,000	100	6.2	36	7.2
Pyrene	10,000	5,000	<2.8	<13	<2.7

[a] MADEP Method 1 Standards are based on soil category S-3 and groundwater category GW-3 values documented in the revisions to the Massachusetts Contingency Plan (310 CMR 40), effective October 31,1997.
[b] VPH value is the sum of the toxicologically-weighted values of C5-C8, C9-C12 (aliphatics) and C9-C10 (Aromatics)
[c] EPH value is the sum of the toxicologically-weighted values of C9-C18, C19-C36 (aliphatics) and C11-C22 (Aromatics)
[d] Reported concentration excludes BTEX and MTBE concentrations.
[e] The toxicity concentration is the toxicologically-weighted value for the hydrocarbon range of interest.
* = Laboratory exceeded the maximum EPH extraction holding time by 6 to 7 days.
- Concentration exceeds Method 1 Standard.

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TABLE 4.3
Soil Analytical Results For TPH, BTEX, and PAHs
Collected From Vertical Soil Borings
Medical Training Facility Site
Westover Air Reserve Base, Massachusetts

Location Depth Below Grade (ft.) Units	Upper Conc. Limits (mg/kg)	Method 1 Standards[b] (mg/kg)	B1-15-17 15-17 (mg/kg)	B1-21-23 21-23 (mg/kg)	B2-29-31 29-31 (mg/kg)	B2-37-39 37-39 (mg/kg)	B2-37-39DUP[a] 37-39 (mg/kg)	B3-31-33 31-33 (mg/kg)	B3-35-37 35-37 (mg/kg)
Analyte									
USEPA Method 418.1									
Total Recoverable Petroleum Hydrocarbons	10,000	5,000	2,400	97.5	1,930	37.5	<27.6	<28.1	<26.3
Volatile Organics (EPA Method 8020A)									
Benzene	2,000	200	<0.0005	<0.0006	<0.0026	<0.0027	<0.0006	<0.0006	<0.0006
Ethylbenzene	10,000	500	<0.0005	<0.0006	0.072	<0.0027	<0.0006	<0.0006	<0.0006
Toluene	10,000	2,500	0.002	0.002	0.014	0.011	0.002	<0.0006	<0.0006
Xylenes (total)	10,000	2,500	0.002	0.002	0.013	0.009	<0.0018	<0.0016	<0.0017
Polyaromatic Hydrocarbons (EPA Method 8310)									
Acenaphthene	10,000	4,000	<0.54	<0.29	<1.1	<0.27	<0.29	<0.290	<0.280
Acenaphthylene	10,000	1,000	<0.54	<0.29	0.37	<0.27	<0.29	<0.290	<0.280
Anthracene	10,000	5,000	0.240	<0.099	0.16	<0.09	<0.098	<0.096	<0.094
Benzo (a) anthracene	100	4	0.130	<0.029	0.15	<0.004	<0.004	<0.004	<0.004
Benzo (b) fluoranthene	100	4	0.010	0.006	<0.015	<0.004	<0.004	<0.004	<0.004
Benzo (k) fluoranthene	400	40	<0.008	0.004	<0.015	<0.004	<0.004	<0.004	<0.004
Benzo (ghi) perylene	10,000	2,500	<0.018	<0.017	<0.036	<0.009	<0.01	<0.010	<0.009
Benzo (a) pyrene	100	0.7	<0.074	<0.004	<0.014	<0.004	<0.004	<0.004	<0.004
Chrysene	400	40	0.100	0.030	0.086	<0.004	<0.004	<0.004	<0.004
Dibenz (a,h) anthracene	100	0.8	<0.018	<0.010	<0.036	<0.009	<0.01	<0.010	<0.009
Fluroanthene	10,000	1,000	0.390	0.048	0.53	<0.009	<0.01	<0.010	<0.009
Fluorene	10,000	4,000	0.390	0.084	0.3	0.036	<0.04	<0.040	<0.038
Indeno (1,2,3-cd) pyrene	100	4	<0.018	<0.010	<0.036	<0.009	<0.01	<0.010	<0.009
Naphthalene	10,000	1,000	<0.54	<0.29	0.64	<0.27	<0.29	<0.290	<0.280
Phenanthrene	10,000	100	2.400	0.470	1.2	0.067	<0.04	<0.039	<0.038
Pyrene	10,000	5,000	0.150	0.059	0.16	<0.009	<0.01	<0.010	<0.009

[a] Soil sample B2-37-39DUP is a field duplicate of sample B2-37-39.

[b] MADEP Method 1 Standards are based on soil category S-3 and groundwater category GW-3 values documented in the revisions to the Massachusetts Contingency Plan (310 CMR 40), effective October 31,1997.

[ ] - Concentration exceeds Method 1 Standard.

TABLE 4.4
Soil Analytical Results For TPH, BTEX, and PAHs
Collected From Angle Soil Borings
Medical Training Facility Site
Westover Air Reserve Base, Massachusetts

Location			AB1-23-25	AB1-33-35	AB2-28-30	AB2-38-40	AB3-33-35	AB3-38-40
Boring Angle (degrees from horizontal)			50	50	45	45	50	50
Depth Below Grade (ft.)	Upper Conc.	Method 1	18-19	25-27	20-21	27-28	23-25	29-31
Units	Limits (mg/kg)	tandards[a] (mg/kg	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Analyte								
USEPA Method 418.1								
Total Recoverable Petroleum Hydrocarbons	10,000	5,000	5,120	125	9,350	15,300	14,100	1,810
Volatile Organics (EPA Method 8020A)								
Benzene	2,000	200	<0.180	<0.160	<0.170	<0.200	<0.180	<0.170
Ethylbenzene	10,000	500	<0.180	<0.160	<0.170	0.580	2.300	<0.170
Toluene	10,000	2,500	<0.180	<0.160	<0.170	<0.200	<0.180	<0.170
Xylenes (total)	10,000	2,500	<0.530	<0.490	<0.510	3.070	10.600	<0.510
Polyaromatic Hydrocarbons (EPA Method 8310)								
Acenaphthene	10,000	4,000	1.8	<2.1	<8.2	<6.3	<7.4	0.82
Acenaphthylene	10,000	1,000	3.4	3.1	14.0	12.0	12.0	1.9
Anthracene	10,000	5,000	2.0	1.5	4.7	3.8	11.0	0.75
Benzo (a) anthracene	100	4	0.42	0.32	1.20	1.10	1.10	0.18
Benzo (b) fluoranthene	100	4	<0.031	<0.029	<0.120	<0.089	<0.100	<0.015
Benzo (k) fluoranthene	400	40	<0.031	<0.029	<0.120	<0.089	<0.100	<0.015
Benzo (ghi) perylene	10,000	2,500	<0.076	<0.71	<0.280	<0.210	<0.250	<0.037
Benzo (a) pyrene	100	0.7	<0.030	<0.029	<0.110	<0.086	<0.100	<0.015
Chrysene	400	40	0.28	0.21	0.81	0.71	0.64	0.11
Dibenz (a,h) anthracene	100	0.8	<0.076	<0.71	<0.280	<0.210	<0.250	<0.037
Fluroanthene	10,000	1,000	1.4	1.0	3.9	3.7	3.8	0.54
Fluorene	10,000	4,000	3.3	2.5	8.9	7.1	8.1	1.3
Indeno (1,2,3-cd) pyrene	100	4	<0.076	<0.71	<0.280	<0.210	<0.250	<0.037
Naphthalene	10,000	1,000	6.9	5.5	29.0	24.0	25.0	3.7
Phenanthrene	10,000	100	12.0	9.6	38.0	33.0	32.0	5.3
Pyrene	10,000	5,000	0.4	0.43	1.3	1.4	2	0.17

[a] MADEP Method 1 Standards are based on soil category S-3 and groundwater category GW-3 values documented in the revisions to the Massachusetts Contingency Plan (310 CMR 40), effective October 31,1997.

[ ] - Concentration exceeds Method 1 Standard.

TABLE 4.5
Average Exposure Point Concentrations
Medical Training Facility Site
Westover Air Reserve Base, Massachusetts

Location		AB1-23-25	AB2-38-40	AB3-38-40	Average
Boring Angle (degrees from horizontal)		50	45	50	Exposure Point
Depth Below Grade (ft.)	Method 1	18-19	27-28	29-31	Concentration[f]
Units	tandard[a] (mg/kg	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Analyte					
USEPA Method 8015 (Modified)					
Total Volatile Petroleum Hydrocarbons (VPH)[b]	NA	210	650	100	320
Total Extractable Petroleum Hydrocarbons (EPH)[c]	NA	0.48	3.6	0.84	2
C5-C8 Aliphatics (actual conc.)[d]	500	0.79	15	0.97	6
C5-C8 (toxicity conc.)[e]	NA	0.40	7.5	0.49	3
C9-C12 Aliphatics (actual conc.)	5,000	330	1,200	180	570
C9-C12 (toxicity conc.)	NA	16.5	60	9.0	29
C9-C10 Aromatics (actual conc.)	500	190	580	94	288
C9-C10 (toxicity conc.)	NA	190	580	94	288
C9-C18 Aliphatics (actual conc.)	5,000	2000*	3,800	710*	3,800
C9-C18 (toxicity conc.)	NA	100	190	36	190
C19-C36 Aliphatics (actual conc.)	5,000	110*	210	43*	210
C19-C36 (toxicity conc.)	NA	0.55	1.1	0.2	1.1
C11-C22 Aromatics (actual conc.)	5,000	380*	3,400	800*	3,400
C11-C22 (toxicity conc.)	NA	380	3,400	800	3,400
Volatile Petroleum Hydrocarbons					
Benzene	200	<0.35	<0.52	<0.23	<0.52
Ethylbenzene	500	<0.35	<0.52	<0.23	<0.23
Toluene	2,500	<1.1	<1.6	<0.69	<1.6
Xylenes (total)	2,500	<2.1	<5.1	<1.38	<1.38
Methyl tert-Butyl Ether	200	<1.1	<1.6	<0.69	<1.6
Polyaromatic Hydrocarbons					
Acenaphthene	4,000	3.6	45	7.8	19
Acenaphthylene	1,000	4.5	40	8.8	18
Anthracene	5,000	<2.8	<13	<2.7	<13
Benzo (a) anthracene	4	<2.8	<13	<2.7	<13
Benzo (a) pyrene	0.7	<2.8	<13	<2.7	<13
Benzo (b) fluoranthene	4	<2.8	<13	<2.7	<13
Benzo (k) fluoranthene	40	<2.8	<13	<2.7	<13
Benzo (ghi) perylene	2,500	<2.8	<13	<2.7	<13
Chrysene	40	<2.8	<13	<2.7	<13
Dibenz (a,h) anthracene	0.8	<2.8	<13	<2.7	<13
Fluorene	4,000	4.3	28	3.7	12
Fluroanthene	1,000	<2.8	<13	<2.7	<13
Indeno (1,2,3-cd) pyrene	4	<2.8	<13	<2.7	<13
2-Methylnaphthalene	1,000	16	180	31	76
Naphthalene	1,000	<2.8	32	3.9	18
Phenanthrene	100	6.2	36	7.2	16
Pyrene	5,000	<2.8	<13	<2.7	<13

[a] MADEP Method 1 Standards are based on soil category S-3 and groundwater category GW-3 values documented in the revisions to the Massachusetts Contingency Plan (310 CMR 40), effective October 31,1997.

[b] VPH value is the sum of the toxicologically-weighted values of C5-C8, C9-C12 (aliphatics) and C9-C10 (Aromatics)

[c] EPH value is the sum of the toxicologically-weighted values of C9-C18, C19-C36 (aliphatics) and C11-C22 (Aromatics)

[d] Reported concentration excludes BTEX and MTBE concentrations.

[e] The toxicity concentration is the toxicologically-weighted value for the hydrocarbon range of interest.

[f] The average exposure point concentrations is based on the arithmetic average concentration which provides a conservative estimate of the concentration contacted by a receptor at the exposure point over the period of exposure. The exposure point is defined on Figure 4.3 and in Section 4.4.

* = Laboratory exceeded the maximum EPH extraction holding time by 6 to 7 days. These results were not used to calculate exposure point con

- Concentration exceeds Method 1 Standard.

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SECTION 5

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APPENDIX A

RESPONSE TO COMMENTS ON THE DRAFT FINAL RESPONSE ACTION OUTCOME COMPLETION REPORT

APPENDIX A
RESPONSE TO MADEP COMMENTS TO THE DRAFT FINAL RESPONSE ACTION OUTCOME COMPLETION REPORT

The following responses have been prepared to address Massachusetts Department of Environmental Protection (MADEP) comments on the Response Action Outcome (RAO) Completion Report for the Medical Training Facility (MTF) site at Westover Air Reserve Base (ARB). MADEP comments are shown below in italics with the corresponding response below each comment.

1. *In accordance with 310 CMR 40.1036, a Class A-3 RAO applies to sites where a) a permanent solution has been achieved, b) the level of oil and hazardous material (OHM) has NOT been reduced to background, c) one or more Activity and Use Limitations (AULs) have been implemented to maintain a level of No Significant Risk; and, d) OHM at the site does not exceed an applicable Upper Concentration Limit (UCL) in soil or groundwater as listed in 310 CMR 40.0996 (7) - Table 6.*

   As the site is now, a Class A-3 RAO is not appropriate for this site because, 1) an AUL was not in place prior to the Risk Assessment/RAO and 2) OHM concentrations at the site exceed the UCLs for TPH in four locations.

   A Class A-4 may be more appropriate for this site if an AUL is used. A Class A-4 RAO applies to sites where; a) a permanent solution has been achieved, b) the level of OHM is not reduced to background, c) one or more AULs have been implemented to maintain a level of No Significant Risk, d) OHM in soil is located at a depth greater than 15 feet from the ground surface, and; e) an evaluation conducted pursuant to 310 CMR 40.0860 indicates that it is not feasible to reduce the concentrations of OHM in soil located at a depth greater than 15 feet from the ground surface to less than or equal to the UCLs.

   Although OHM concentrations at the site exceed the UCLs for TPH at two locations, the average exposure point concentration of the EPH/VPH fractions comprising the TPH are less than the Method 1 Standard (see comment #8). We have amended the report to include the identification of the exposure point and the average exposure point concentration (Section 4.3). As a result, we have concluded that a level of no significant risk exists at the site, and a Class A-2 RAO is more appropriate than a Class A-3 or A-4 RAO.

2. *On page 4-2, Parsons states that 7 mg/kg is the action level for 2-methylnaphthalene. I am not sure where this number came from. The Method 1 Cleanup Standard for S-3/GW-3 situation is 1,000 ug/g (ppm) (see Table 4: 310 CMR 40.0975 (6)(c). With this correction, the concentration of 2-methylnaphthalene detected at this site has not exceeded the Method 1 Standard.*

   Section 4 and Tables 4.1 through 4.4 have be revised to reflect the correct Method 1

standard for 2-methylnaphthalene. As a result of this correction, no PAH compounds have exceeded the Method 1 Standard.

3. *The report did not contain a site map which documents the portion of the disposal site for which the RAO applies. The map should show dimensions from buildings, depth (horizontal and vertical depths of soil contamination), other benchmarks or surveyed property lines.*

   A site map which documents the portion of the disposal site for which the RAO applies has been added to the report (Figure 4.3).

4. *Tables 4.1 and 4.2 contain incorrect Method 1 soil standards (S-3/GW-3) for some of the PAHs. Refer to the October 31, 1997 MCP Table 4: 310 CMR 40.0975 (6)(c) page 1655.*

   Section 4 and Tables 4.1 through 4.4 have be revised to reflect the correct Method 1 Standard for 2-methylnaphthalene. As a result of this correction, no PAH compounds have exceeded the Method 1 Standard.

5. *The groundwater category "GW-3" is incorrectly identified as "G-3" in the text. The MCP term "Method 1 Standards" should, where appropriate, replace the term "Class A-3 Action Levels."*

   References to groundwater category G-3 have been replaced by GW-3 in the text.

6. *The MCP requires (310 CMR 40.0960) the characterization of the risk of harm to safety at a site.*

   A new subsection, Subsection 4.5, Characterization of Risk of Harm to Safety, has been added to the report to address the MCP requirement of characterization of the risk of harm to safety.

7. *The Method 1 Risk Characterization should evaluate the current and reasonably foreseeable Site Activity and Use identified pursuant to 310 CMR 40.0923.*

   A new subsection, Subsection 4.4, Evaluation of Reasonably Foreseeable Site Activity and Use, has been added to the report to address this comment.

8. *The Department does not agree with the conclusion that "This site meets MADEP RAO category A-3 action levels for BTEX, and PAH compounds, excluding 2-methylnaphthalene." When using the Method 1 Risk Assessment process to evaluate a site for No Significant Risk, all the contaminants in all the media of concern must be less than the Method 1 Standards for a condition of No Significant Risk to exist. The Method 1 Standards were exceeded for TPH and C9-C10 Aromatics, therefore a level of No Significant Risk does not exist at this site.*

Method 1 Standards for 2-methylnaphthalene were reported incorrectly in the draft report. The 2-methylnaphthalene concentrations reported for the site are below the correct Method 1 Standard. The average exposure point concentrations have been calculated based on the arithmetic average concentration of three of the angle boring samples collected from beneath the MTF building. As a result, all VOC, PAH and EPH/VPH average exposure point concentrations are below the Method 1 Standard.

Although the concentrations of TPH reported for the site exceeded Method 1 Standards, the MCP considers a level of no significant risk to exist if the exposure point concentrations of EPH/VPH fractions comprising the TPH are below the Method 1 Standard, even though the average TPH exposure point concentration exceeded the Method 1 Standard. The conclusion of the report has been revised to reflect this comment.

9. *Make sure the method detection limits for the analytes are less than the MCP Method 1 Standards.*

   The method detection limits for TPH (Method 418.1), VOCs (Method 8020A), PAHs (Method 8310) and EPH/VPH (Modified Method 8015) were all less than the MCP Method 1 Standards.

10. *The Department questions whether the EPH results which exceeded the holding time for extraction by 5 days are valid (AB1-23-25) and AB3-29-31). Department guidance dated January, 1998, and entitled, "Method for the Determination of Extractable Petroleum Hydrocarbons (EPH)" states that the soil samples for EPH analysis should be extracted within 7 days and analyzed within 40 days.*

    Table 4.2 has been revised to identify the EPH laboratory results that exceeded the extraction time. These analytical results have not been used in the calculation of average exposure point concentrations (Table 4.5). Subsection 4.2 has been revised to include the following sentence "The EPH analytical results from these soil samples will remain in the report as possible EPH soil concentrations and are noted as having exceeded the holding time."

11. *It may be prudent to evaluate whether the SVE system can be utilized again to see if contaminant levels can be reduced to below Method 1 Standards.*

    As discussed in comment #8, the average exposure point concentrations are below the Method 1 Standards for all compounds, excluding TPH, and we have concluded that a level of no significant risk exists at the site. Subsection 4.6 discusses the feasibility of achieving background concentrations using the bioventing system.

12. *The appropriate BWSC Forms should accompany the final report.*

    Appropriate BWSC forms will be attached to the final version of the Response Action Outcome Completion Report submitted to the MADEP.

APPENDIX B

CLOSURE SAMPLING AND ANALYSIS PLAN

FINAL

Closure Sampling and Analysis Plan for Medical Training Facility

Westover Air Reserve Base
Massachusetts

Prepared For

Air Force Center for Environmental Excellence
Brooks Air Force Base

and

439th Support Group/ 439th Airlift Wing
Westover Air Reserve Base, Massachusetts

April 1997

PARSONS ENGINEERING SCIENCE, INC.

290 Elwood Davis Road, Suite 312 • Liverpool, New York 13088 • (315) 451-9560 FAX (315) 451-9570

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PARSONS

FINAL

CLOSURE SAMPLING AND ANALYSIS PLAN FOR MEDICAL TRAINING FACILITY WESTOVER AIR RESERVE BASE, MASSACHUSETTS

PREPARED FOR

AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE

BROOKS AFB, TEXAS

AND

439TH SUPPORT GROUP/439TH AIRLIFT WING
WESTOVER ARB, MASSACHUSETTS

PREPARED BY

PARSONS ENGINEERING SCIENCE, INC.
290 ELWOOD DAVIS RD., SUITE 312
LIVERPOOL, NEW YORK 13088

APRIL 1997

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SECTION 1
INTRODUCTION

This closure soil sampling and analysis plan (SAP) has been prepared for the US Air Force Center for Environmental Excellence (AFCEE) at Brooks Air Force Base (AFB), Texas; and Westover Air Reserve Base (ARB), Massachusetts. The SAP is intended to guide soil sampling at the Medical Training Facility (MTF) site at Westover ARB. The MTF site is the location of a release of heating oil from a former underground storage tank (UST).

In October 1994 during construction of a new Medical Training Facility, the Army Corps of Engineers uncovered an abandoned 2,000-gallon underground #2 fuel oil storage tank. The tank was removed on November 2, 1994, and petroleum hydrocarbon contaminated soil was encountered below the tank. This event prompted an Immediate Response Action (IRA), and the Massachusetts Department of Environmental Protection (DEP) assigned a Release Tracking Number (#1-10588) to the site.

As part of the Response Action, the MTF site was selected as a pilot test site for the AFCEE-sponsored Extended Bioventing Project. The Extended Bioventing Project is a follow-on contract to the AFCEE Bioventing Pilot Test Initiative project, which included more than 100 *in situ* bioventing pilot tests at 46 Air Force installations nationwide. These tests were designed to collect data on the effectiveness of bioventing for the remediation of vadose zone soils contaminated with fuel hydrocarbons (e.g., JP-4 jet fuel, diesel fuel, gasoline, and heating oil).

The 1-year bioventing pilot test at the MTF was completed in August 1996. The purpose of the pilot test was to evaluate the effectiveness of bioventing in remediating unsaturated soils contaminated with petroleum hydrocarbons thought to have resulted from heating oil released from the former UST. Based on the results of the extended bioventing test, *in situ* bioventing appears to have reduced petroleum hydrocarbon contamination in site soils sufficiently to meet Massachusetts Department of Environmental Protection (DEP) requirements for closure of the site.

This SAP presents a plan for confirmatory soil sampling to document the effectiveness of remediation of hydrocarbon-contaminated soils at the MTF site. The objective of the confirmatory soil sampling is to support a site closure recommendation for the soils contaminated by heating oil in the immediate vicinity of the former UST. The proposed closure sampling described in Section 4 is specific to the vadose zone soils targeted by the bioventing system in the vicinity of the former UST. Previous investigations have determined that groundwater has not been impacted by the release of petroleum hydrocarbons at the UST site. The closure soil sampling effort is being performed as part of the AFCEE Extended Bioventing project (Contract No. F41624-92-D-8036, Order 17).

This SAP consists of ten sections, including this introduction. Section 2 includes a site description, history, and summaries of previous investigations and remediation activities. Section 3 summarizes site closure requirements. A detailed SAP is presented in Section 4. Analytical results will be presented in a response action completion report as described in Section 5. Section 6 is a waste management plan for investigation-derived waste generated during drilling and sampling activities. Section 7 lists Westover ARB support requirements and Section 8 gives the proposed project schedule. Points of contact are provided in Section 9 and the references cited are provided in Section 10.

SECTION 2
SITE DESCRIPTION

2.1 Site Location And History

The Medical Training Facility (MTF), located in the central portion of the base between Niagara and Walker streets (Figure 2.1), was constructed in 1994 and 1995. During construction of the new facility, the Army Corps of Engineers uncovered an abandoned 2000-gallon underground #2 fuel oil storage tank within the new building foot print. The tank was removed on November 2, 1994 and petroleum hydrocarbon contaminated soil was encountered below the tank. The source of contamination is suspected to be a result of a historic spill. The locations of the MTF, the former UST, and the extent of petroleum hydrocarbon contaminated soil are shown on Figure 2.2.

2.2 Site Geology And Hydrology

Soils above the water table consist of fine sand with a trace of silt to a depth of at least 30 feet below ground surface (bgs). Fine to coarse sand with a trace of gravel exists beneath the fine sand layer to at least 42 feet bgs. Groundwater is encountered at a depth of approximately 40 feet bgs and generally flows in a westerly direction. A hydrogeologic cross-section of the MTF site is shown in Figure 2.3.

2.3 Previous Investigations

In October 1994 during construction of the new MTF, the Army Corps of Engineers uncovered an abandoned 2,000 gallon underground #2 fuel oil storage tank. In November 1994, the Corps proceeded to remove the tank and some contaminated soil surrounding the tank. Environmental Compliance Services, Inc. (ECS) was contracted to conduct Immediate Response Actions (IRA) including performing a soil gas survey at 12 locations near the construction site, collecting three groundwater samples from temporary monitoring wells upgradient and downgradient of the former underground storage tank (UST), and performing a ground penetrating radar (GPR) survey in the area of the former UST to identify the possible presence of additional USTs in the area.

The ECS assessment activities revealed no evidence of groundwater contamination near the former UST area, and no evidence of soil gas contamination or additional USTs in the area outside of the former UST area (ECS, 1994).

In December 1994, Tighe and Bond, Inc. advanced four soil borings to the groundwater table within the new building footprint in order to further delineate the extent of contamination. These soil borings locations are shown on Figure 2.2. Soil samples were collected from each boring and analyzed for total petroleum hydrocarbons (TPH). Two soil samples, collected from soil borings B-1 and B-3 from between 15 and 25 feet below ground surface, contained TPH concentrations above 10,000 mg/kg, which exceeded the Massachusetts Department of Environmental Protection (DEP) risk-based

soil clean-up goal of 5,000 ppm (310 CMR 40.0975). Table 2.1 summarizes the analytical results for petroleum constituents in subsurface soil and compares them to the Massachusetts DEP clean-up goals. Figure 2.2 shows the distribution of detected TPH compounds prior to site remediation.

In April 1995, a pilot scale bioventing system was installed in the MTF area by Parsons Engineering Science, Inc. (Parsons ES) as part of the Air Force Center for Environmental Excellence (AFCEE) Extended Bioventing Project (Contract No. F41624-92-R-8036, Order 17). As shown in Figure 2.2, the installed bioventing system consisted of a single vent well (VW), three multi-depth vapor monitoring points (MPs), and a blower unit. During installation, respiration and air permeability testing and soil and soil gas sampling were performed. A detailed description of bioventing system design and initial site activities are provided in the July 1995 Bioventing Interim Test Results report prepared by Parsons ES for this site. The project at the MTF included 1 year of system operation followed by soil gas sampling and respiration testing.

Soil gas samples were collected and *in situ* respiration testing was performed in July and August 1996, following 1 year of system operation. Analytical results from the soil gas sampling and respiration testing indicated that significant reductions in TPH and BTEX compounds had taken place with the estimated 30- to 40-foot radius of the vent well (VW). The system was shut down 30 days prior to testing to allow soils and soil gas to come to equilibrium in order to compare 1-year and initial conditions. Table 2.2 summarizes the results of the soil gas sampling and Table 2.3 summarizes initial and 1-year respiration and fuel biodegradation rates at the site.

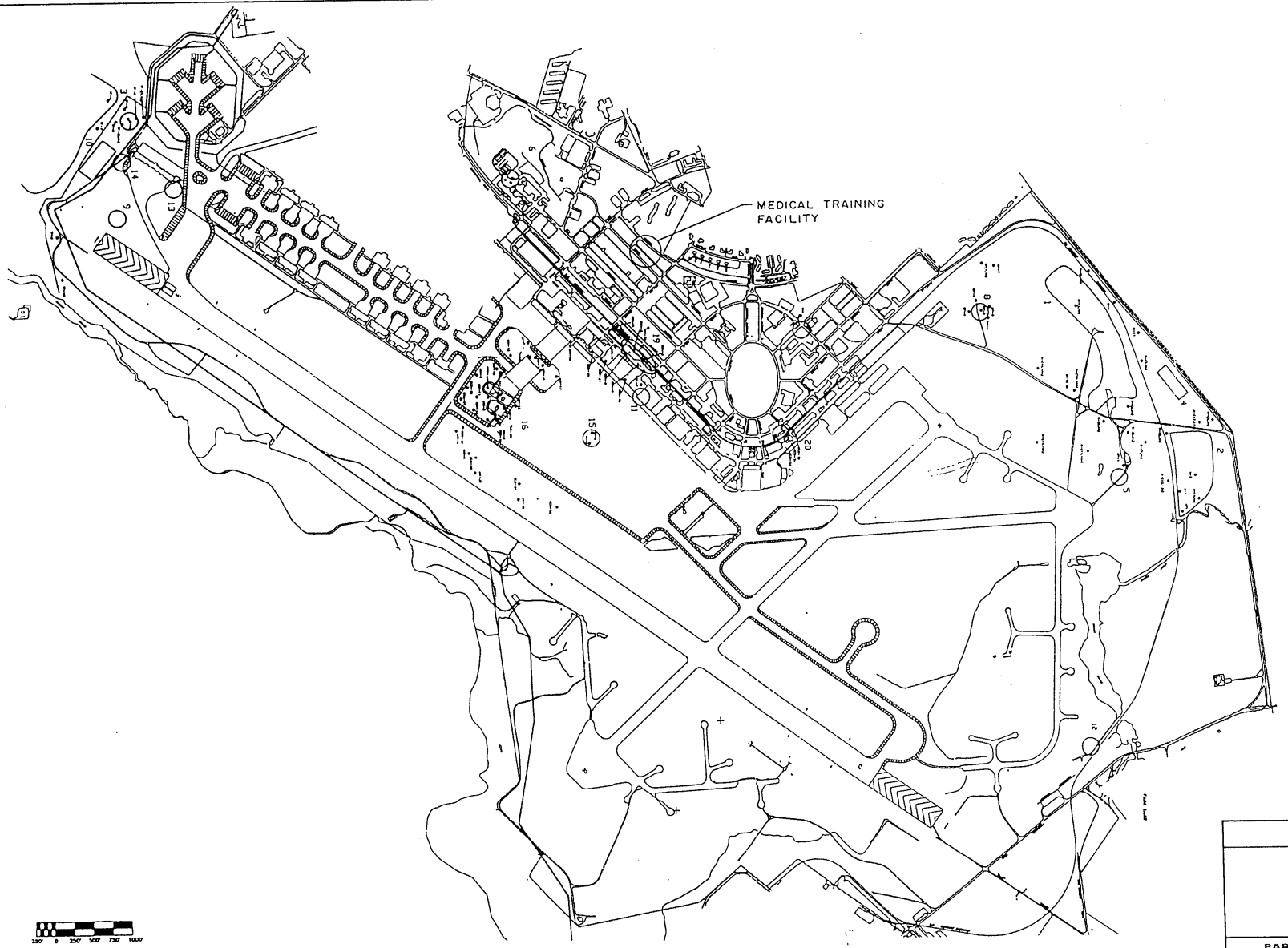

FIGURE 2.1

WESTOVER AIR RESERVE BASE
MASSACHUSETTS

SITE LOCATION MAP

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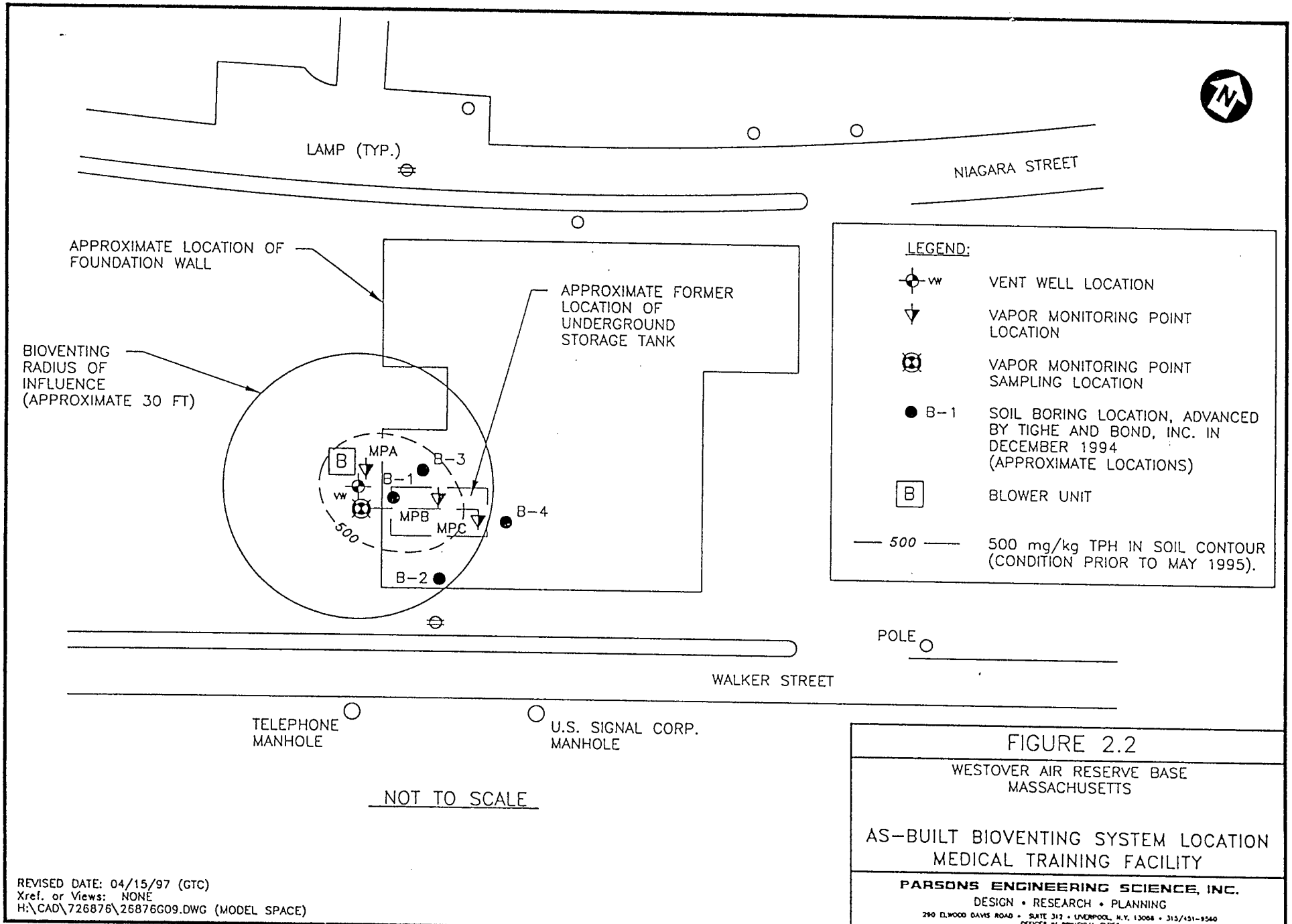

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FIGURE 2.2

WESTOVER AIR RESERVE BASE
MASSACHUSETTS

AS-BUILT BIOVENTING SYSTEM LOCATION
MEDICAL TRAINING FACILITY

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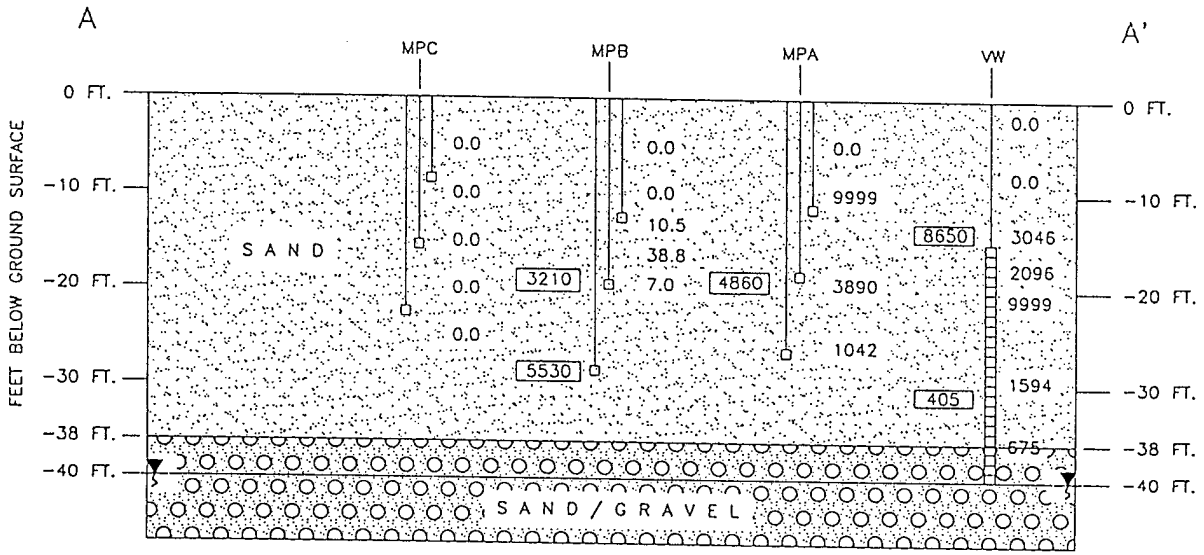

LEGEND:

GROUNDWATER LEVEL	3890	SOIL GAS FIELD SCREENING RESULTS FOR TOTAL VOLATILE HYDROCARBONS (ppmv)
MONITORING POINT	8650	LABORATORY RESULTS FOR SOIL TOTAL PETROLEUM HYDROCARBONS (mg/Kg)
AIR INJECTION WELL	VW	VENT WELL
SCREEN INTERVAL	MP-A	MONITORING POINT

10' 5' 0 10'

Approximate Scale in Feet

HORIZONTAL SCALE

20' 10' 0 20'

Approximate Scale in Feet

VERTICAL SCALE

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FIGURE 2.3

WESTOVER AIR RESERVE BASE
MASSACHUSETTS

GEOLOGIC PROFILE
MEDICAL TRAINING FACILITY

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Table 2.1
Soil Analytical Results Compared to Massachusetts DEP Criteria
Medical Training Facility Site
Westover Air Reserve Base, Massachusetts

	Analyte[a]				
	TPH (mg/kg)[b]	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
Massachusetts DEP Criteria					
Class A-2 Standard[c]	500	10	90	80	500
Class A-3 Standard[d]	5,000	10	90	80	500
Sample Location[e]					
Parsons ES[f]					
VW-14-16	8650[j]	0.052U[g]	0.052U	0.089	1.1
VW-30-32	405	0.053U	0.053U	0.053U	0.13U
MPA-20-22	4,860	0.053U	0.053U	0.053U	0.39
MPB-20-22	3,210	0.057U	0.057U	0.057U	0.14U
MPB-26-28	5,530	0.068U	0.21	0.068U	1.5
TBI[h]					
B-1 (15-17)	18,000	---[i]	---	---	---
B-2 (40-42)	55	---	---	---	---
B-3 (20-22)	14,000	---	---	---	---
B-4 (40-42)	54	---	---	---	---

[a] TPH=total petroleum hydrocarbons analyzed by EPA Method 418.1; BTEX analyzed by EPA Method SW8020.

[b] mg/kg=milligrams per kilogram.

[c] Class A-2 - Closure with no activity and use limitation (AUL), based on S-1 values.

[d] Class A-3 - Closure with implementation of an AUL deed restriction, based on S-3 values.

[e] Sample location gives location of boring and sample depth in feet below ground surface.

[f] Soil samples collected in April, 1995, by Parsons ES, prior to bioventing system startup.

[g] U=compound analyzed for, but not detected. Number shown represents the method detection limit.

[h] Soil samples collected on December, 1994, by Tighe and Bond, Inc.

[i] ---=not analyzed.

[j] Shading indicates detection above Class A-3 standards.

Table 2.2
Initial and 1-Year Soil Gas Field and Laboratory Analytical Results
Medical Training Facility
Westover Air Reserve Base, Massachusetts

Sample Location[a]	Sampling Event[b]	Field Screening Data			Analytical Data				
		Oxygen (percent)	Carbon Dioxide (percent)	Field TVH[c] (ppmv)[d]	Laboratory TVH (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Xylenes (ppmv)
VW	Initial	19.5	1	78	150	0.1	1.1	0.32	2.7
	1-Year	---	---	---	---[e]	---	---	---	---
MPA-11-13	Initial	19.8	1.1	110	260	0.009	0.56	0.74	4.7
	1-Year	19.1	0.6	500	8.8	0.006	0.017	0.015	0.11
MPA-26-28	Initial	19.1	1.5	94	330	0.011U	0.011U	1	5.8
	1-Year	7.0	8.5	1100	45	0.002	0.006	0.014	0.2
MPB-12-14	Initial	19.8	0.8	42	48	0.005	0.15	0.054	0.25
	1-Year	20.0	0.2	100	9.9	0.002U	0.006	0.003	0.027
MPB-19-21	Initial	19.5	1.0	63	240	0.01U	0.26	0.21	0.84
	1-Year	19.9	0.3	600	8.7	0.002	0.004	0.003	0.022
MPB-26-28	Initial	18.9	1.5	150	430	0.0018U	0.0018U	0.53	3.6
	1-Year	20.0	0.0	80	---	---	---	---	---
MPC-8-10	Initial	20.0	0.5	34	---	---	---	---	---
	1-Year	19.2	0.7	300	---	---	---	---	---
MPC-15-17	Initial	20.0	0.5	63	---	---	---	---	---
	1-Year	---[g]	---	---	---	---	---	---	---
MPC-22-24	Initial	20.0	0.5	32	---	---	---	---	---
	1-Year	20.2	0.0	70	---	---	---	---	---

[a] Sample location identifies the monitoring point and depth in feet below ground surface.
[b] Initial soil gas sampling was performed on 5 June 1995. 1-Year soil gas sampling was performed on 29 July 1996.
[c] TVH=total volatile hydrocarbons.
[d] ppmv=parts per million, volume per volume.
[e] ---=not analyzed.
[f] U=compound analyzed for , but not detected. Number shown represents the method detection limit.
[g] ---=not analyzed due to flooded monitoring point screen.

Table 2.3
Medical Training Facility
Respiration and Degradation Rates
Westover Air Reserve Base, Massachusetts

Location-Depth (feet below ground surface)	Initial[a/]		1-Year[b/]	
	K_o (% O_2/min)	Degradation Rate (mg/kg/year)[c/]	K_o (% O_2/min)	Degradation Rate (mg/kg/year)[c,d/]
MPA-11-13	0.00024	71	0.00026	76
MPA-26-28	0.00021	62	0.0028	671
MPB-26-28	0.00028	43	0.000048	7

[a/] Initial respiration testing was performed in June 1995.
[b/] 1-Year respiration testing was performed in July and August 1996.
[c/] Milligrams of hydrocarbons per kilogram of soil per year.
[d/] Assumes moisture content of the soil following 1 year is the same as initial moistures.

SECTION 3
SITE CLEANUP REQUIREMENTS

The objective of the closure soil sampling is to support a Response Action Outcome Statement recommendation for the soil contaminated by fuel oil near the MTF at Westover ARB, Massachusetts. This sampling plan targets only unsaturated soils above the groundwater table. Groundwater has not been significantly impacted as described in Section 2.

Cleanup standards are based on the Massachusetts DEP's Risk Characterization Method 1 of the Massachusetts Contingency Plan. Based on the known site conditions, site soils at the MTF site would likely be classified as either a Class A-2 or a Class A-3 Response Action Outcome (RAO). Class A RAOs refer to permanent response actions which eliminates or controls a source of oil and/or hazardous material. Definitions of the three Class A RAOs are summarized below.

Class A-1 applies to sites where:

- a permanent solution has been achieved and the level of oil and hazardous material has been reduced to background; or
- sites where response actions have eliminated all threats of release and no release of oil and/or hazardous material to the environment has occurred.

Class A-2 applies to sites where:

- a permanent solution has been achieved and the level of oil and hazardous material has not been reduced to background; and
- one or more Activity and Use Limitations are not required to maintain a level of No Significant Risk.

Class A-3 applies to sites where:

- a permanent solution has been achieved and the level of oil and hazardous material in the environment has not been reduced to background; and
- one or more Activity and Use Limitations have been implemented to maintain a level of no significant risk.

In accordance with the Massachusetts Contingency plan, soil must be categorized as either category S-1, S-2 or S-3. The soil categories are based on the potential for exposure. Category S-1 is associated with the highest potential for exposure and Category S-3 is associated with the lowest potential for exposure. Sites which meet applicable S-2 or S-3, but not S-1 soil standards must implement an Activity and Use

Limitation to ensure that the soil category does not change without further assessment/remediation. Definitions of the soil categories are described below:

Category S-1 applies to sites where:

- impacted soil is accessible (less than 3 feet below the ground surface)
- children are present with high frequency or low frequency but high intensity or where adults are present at a high frequency and high intensity.

Category S-2 applies to sites where:

- impacted soil is potentially accessible (between 3 and 15 feet unpaved, or 0 to 15 feet paved)
- children are present with high frequency and low intensity, low frequency and high intensity or where adults are present at a high frequency and high intensity.

Category S-3 applies to sites where:

- impacted soil is isolated (greater than 15 feet below ground surface or under the footprint of a building or permanent structure).

Assuming a Class A-3 RAO (Category S-3 soil classification) for impacted soils at the MTF, soils should be remediated to concentrations of less than 5,000 mg/kg total petroleum hydrocarbons (TPH), 10 mg/kg benzene, 90 mg/kg toluene, 80 mg/kg ethylbenzene, and 500 mg/kg xylenes. Assuming a Class A-2 RAO (Category S-1 soil classification), soils should be remediated to concentrations of less than 500 mg/kg TPH and must meet Class A-3 RAO benzene, toluene, ethylbenzene, and xylene concentrations. A compound by compound list of cleanup goals for both a Class A-2 and a Class A-3 RAO is shown on Table 3.1. The Class RAO (e.g. Class A-2 or Class A-3) at the MTF will depend on the results of the soil sampling.

A licensed site professional (LSP), Mr. Robert Kane (LSP # 4333) of the Parsons ES office in Boston, Massachusetts has become the new LSP of record on this project. Mr. Kane will advise the project team on regulatory issues pertaining to site closure, will review all pertinent site documents, and will ensure that the following site closure requirements are met, prior to recommending site closure to the Massachusetts DEP.

Table 3.1
Massachusetts Contingency Plan
Soil Cleanup Goals
Medical Training Facility Site
Westover Air Reserve Base, Massachusetts

Analyte[a]	Class A-2 RAO Cleanup Goals (mg/kg)[b]	Class A-3 RAO Cleanup Goals (mg/kg)[c]
USEPA Method 418.1		
Total Recoverable Petroleum Hydrocarbons	500	5000
USEPA Method 8020A		
Volatile Organics		
Benzene	10	10
Chlorobenzene	8	8
1,2-Dichlorobenzene	100	200
1,3-Dichlorobenzene	100	200
1,4-Dichlorobenzene	2	2
Ethylbenzene	80	80
Toluene	90	90
Xylenes (total)	500	500
USEPA Method 8310		
Polyaromatic Hydrocarbons		
Acenaphthene	20	20
Acenaphthylene	100	100
Anthracene	1000	1000
Benzo (a) anthracene	0.7	4
Benzo (b) fluoranthene	0.7	4
Benzo (k) fluoranthene	7	40
Benzo (ghi) perylene	100	100
Benzo (a) pyrene	0.7	0.7
Chrysene	7	40
Dibenzo (a,h) anthracene	0.7	0.8
Fluroanthene	600	600
Fluorene	400	400
Indeno (1,2,3-cd) pyrene	0.7	4
Naphthalene	4	4
Phenanthrene	700	700
Pyrene	500	500

a\ VPH/EPH RAO cleanup goals are not available.

b\ Class A-2 RAO cleanup goals are based on soil category S-1 and groundwater category GW-1 standards.

c\ Class A-3 RAO cleanup goals are based on soil category S-3 and groundwater category GW-1 standards.

SECTION 4
SAMPLING AND ANALYSIS PLAN

The following SAP describes the sampling locations and depths, soil sampling procedures, and analytical methods that will be used to collect sufficient data to verify remediation of MTF site soils and to support site closure.

As described in Section 2, results from the limited soil gas sampling conducted following approximately 12 months of bioventing indicated significant reductions in soil BTEX and TPH concentrations attributed to bioventing remediation. Prior to bioventing, soil petroleum hydrocarbon contamination was limited to an area of approximately 25 feet wide, 40 feet long and approximately 15 to 30 feet deep near the former UST location. Therefore, Parsons ES will install and sample 3 vertical and 3 angle boreholes in the vicinity of the former UST. Vertical borings will be installed along the outside of the building foundation and within the documented area of soil contamination. Angle borings will be installed to collect soil samples from beneath the building and within the former UST excavation. The soil samples collected from beneath the building, along with the samples collected from outside of the building foundation, will allow a more complete characterization of the possible petroleum hydrocarbon contamination remaining in the soils.

4.1 Drilling, Sampling, And Equipment Decontamination

Three vertical and three angled boreholes will be drilled and sampled in the vicinity of the former UST at the approximate locations shown on Figure 4.1. Boreholes will be advanced using a drill rig equipped with the capability of drilling in the vertical position and at an angle to the ground surface. Vertical boreholes will be drilled to the groundwater table at approximately 40 feet below the ground surface. Angled boreholes will be drilled at approximately a 45 degree angle, beginning 15 feet away from the building foundation. These boreholes will be completed to 30 feet below the ground surface, and 15 feet within the building foundation. All drilling will be performed using 4.25-inch inside-diameter (ID) hollow-stem augers. Each borehole will be logged by a Parsons ES geologist.

Soil samples will be collected at 2 to 4 foot intervals from 15 feet bgs to the bottom of each boring. Samples will be screened with a photoionization detector (PID) or a total volatile hydrocarbon analyzer (TVHA). Soil samples exhibiting staining, odor, or headspace readings above background will be sent to a laboratory for analysis. A maximum of two samples from each borehole will be analyzed. If none of the soil samples collected from the boring exhibit evidence of contamination, then one soil sample will be analyzed from the 15 to 17 foot bgs interval and one will be analyzed from the deepest soil sample collected from that boring. In addition, one background sample will be colected in an area southeast of the MTF site. This sample will be collected at a depth interval of 2 to 4 feet using a hand auger.

The downhole equipment will be cleaned before use and between boreholes to prevent cross-contamination. Cleaning will be accomplished using a high pressure hot water wash, followed by a potable water rinse. Decontamination fluids will be collected and contained in labeled 55-gallon drums. Drill cuttings will also be contained in labeled 55-gallon drums. However, to minimize cutting disposal costs, soil showing no field evidence of contamination will be returned to the borehole from which they were generated.

4.2 Analytical Methods

The soil sampling analytical methods and detection limits are presented in Table 4.1. All samples will be sent to Inchcape Testing Services in Richardson, Texas. Soil samples will be analyzed for TPH by USEPA Method 418.1, BTEX by USEPA Method SW8020A, and polyaromatic hydrocarbons (PAHs) by USEPA Method SW8310. In addition, the three angled boring samples and two of the vertical boring samples will also be analyzed for volatile petroleum hydrocarbons (VPH) and extractable petroleum hydrocarbons (EPH) by USEPA Method SW8015 Modified. The background sample will be analyzed for TPH, VPH and EPH. Quality control (QC) samples will be collected and analyzed to assess field and laboratory methods. QC samples to be analyzed include a minimum of one trip blank, one matrix spike/matrix spike duplicate, and one field duplicate.

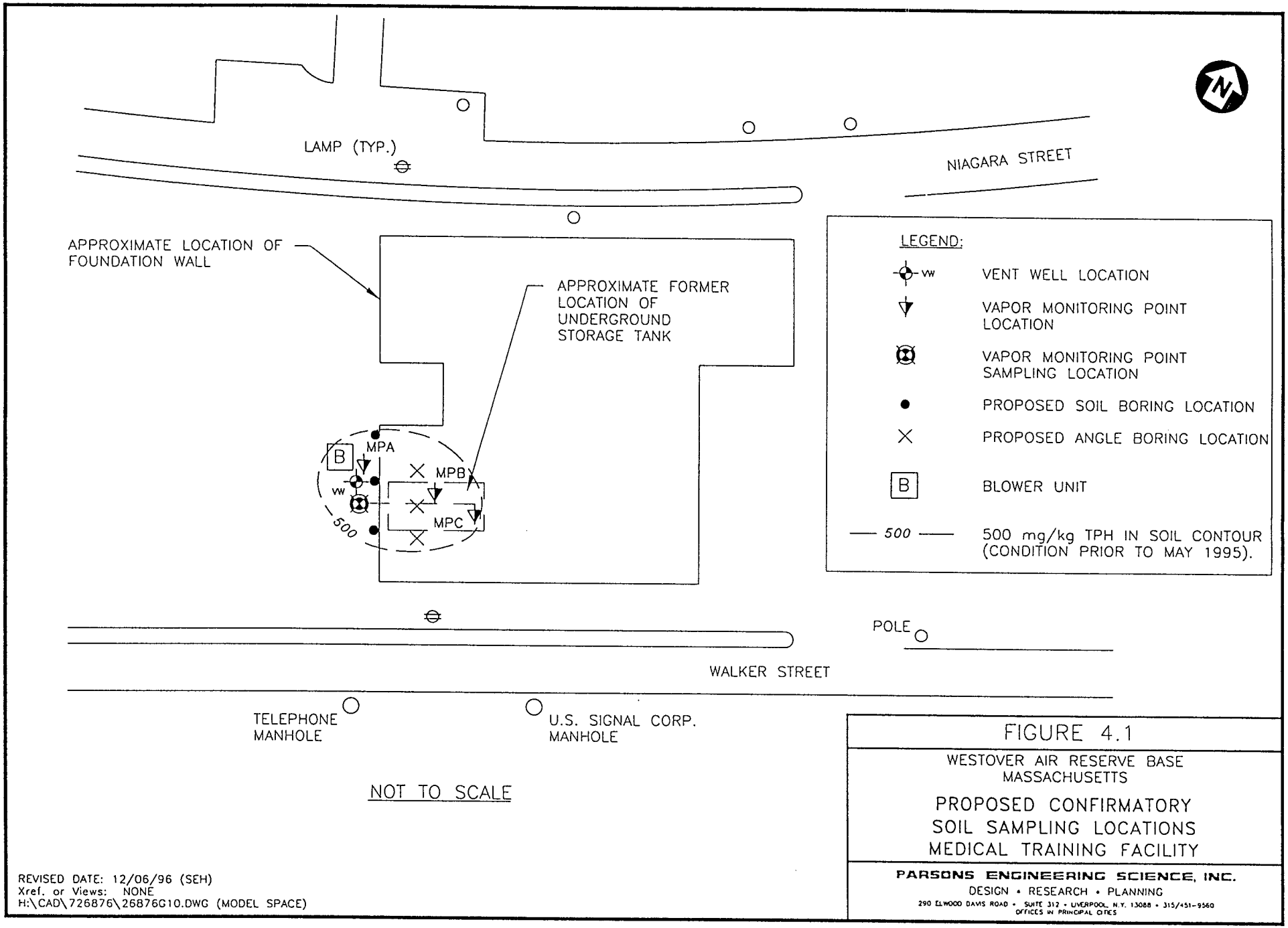

FIGURE 4.1

WESTOVER AIR RESERVE BASE
MASSACHUSETTS

PROPOSED CONFIRMATORY
SOIL SAMPLING LOCATIONS
MEDICAL TRAINING FACILITY

PARSONS ENGINEERING SCIENCE, INC.
DESIGN • RESEARCH • PLANNING
290 ELWOOD DAVIS ROAD • SUITE 312 • LIVERPOOL, N.Y. 13088 • 315/451-9560
OFFICES IN PRINCIPAL CITIES

REVISED DATE: 12/06/96 (SEH)
Xref. or Views: NONE
H:\CAD\726876\26876G10.DWG (MODEL SPACE)

Table 4.1
Proposed Soil Sample Analytical Methods,
Practical Quantitation Limits, and Number of Samples
Medical Training Facility Site
Westover Air Reserve Base, Massachusetts

Analyte	Number of Samples[a]	Detection Limit (ug/kg)
USEPA Method 418.1		
Total Recoverable Petroleum Hydrocarbons	12	10
USEPA Method 8015 (Modified)		
Volatile Petroleum Hydrocarbons (VPH)	5	10
Extractable Petroleum Hydrocarbons (EPH)	5	10
USEPA Method 8020A		
Volatile Organics		
Benzene	12	1
Chlorobenzene	12	2
1,2-Dichlorobenzene	12	4
1,3-Dichlorobenzene	12	4
1,4-Dichlorobenzene	12	3
Ethylbenzene	12	2
Toluene	12	2
Xylenes (total)	12	2
USEPA Method 8310		
Polyaromatic Hydrocarbons		
Acenaphthene	12	1.2
Acenaphthylene	12	1.54
Anthracene	12	0.44
Benzo (a) anthracene	12	0.009
Benzo (b) fluoranthene	12	0.012
Benzo (k) fluoranthene	12	0.05
Benzo (ghi) perylene	12	0.011
Benzo (a) pyrene	12	0.015
Chrysene	12	0.1
Dibenz (a,h) anthracene	12	0.02
Fluroanthene	12	0.14
Fluorene	12	0.14
Indeno (1,2,3-cd) pyrene	12	0.03
Naphthalene	12	1.2
Phenanthrene	12	0.42
Pyrene	12	0.18

[a] Excludes QC samples. Number of samples indicate maximum number of samples analyzed assuming two samples are analyzed per boring.

SECTION 5
RESPONSE ACTION COMPLETION REPORT

Following receipt of the laboratory analytical results, a Draft Response Action Completion Report and a Response Action Outcome Statement will be prepared by a licensed site professional (LSP) and submitted to Westover ARB and AFCEE.

The report will contain the following information for the MTF site:

- Results of previous soil and groundwater sampling results, including the reasoning for not resampling/further assessing the groundwater at the site;
- Plot plans showing final borehole locations;
- A site map documenting the portion of the disposal site for which the RAO applies. The map will include dimensions from buildings, depth, and other benchmarks or surveyed property lines to sufficiently define the RAO area;
- Summary of field activities;
- Assessment of analytical results in comparison to Massachusetts DEP's Risk Characterization Method 1 soil cleanup criteria for TPH and BTEX;
- Laboratory analytical reports and chain-of-custody forms;
- Borehole logs;
- Conclusions and recommendations for site closure or additional cleanup action; and
- A description of any operation, maintenance, and/or monitoring that will be required to confirm and/or maintain conditioning at the site.

Comments received from Westover ARB and AFCEE will be incorporated into a draft final report to be distributed to Massachusetts DEP, AFCEE and Westover ARB. Any comments received from the Massachusetts DEP on the draft final version will be incorporated into a final report.

SECTION 6
WASTE MANAGEMENT PLAN

This waste management plan applies to the activities that will be performed for confirmation soil sampling at Westover ARB's Medical Training Facility. The plan describes the types of investigation derived waste (IDW) that will be generated and management of the generated waste, including inventory, tracking, reporting, and disposal.

6.1 Waste Types

The waste materials that may be generated during the confirmation sampling and managed under this plan include both solid materials and waste waters. The solid materials include cuttings produced from drilling soil boreholes, disposable sampling equipment, and personal protective equipment (PPE). The waste waters that may be produced include rinseate water from decontamination of drilling and sampling equipment. The following paragraphs describe the management procedure for these materials.

6.2 Waste Management

6.2.1 Drill Cuttings

Soil drill cuttings, as an environmental media, are not considered as solid waste. They can, however, contain listed hazardous wastes or enough hazardous constituents that they may exhibit hazardous waste characteristics. The general approach is to manage soil cuttings in a conservative manner by containerizing them, unless there is information available to predetermine that the soil is clean. The following paragraphs describe the management of drill cuttings from soil boreholes.

The soil borehole sampling locations were selected to confirm adequate remediation of soils previously identified as being contaminated with fuel related hydrocarbons. As such, drill cuttings from site boreholes that show evidence of petroleum contamination (i.e. staining, odor, or PID reading) will be containerized into 55-gallon drums (DOT 17-H) as the standard procedure. Drill cuttings that do not show evidence of petroleum contamination will be returned to the bore hole from which they were generated. The typical borehole total depth is expected to be approximately 40 feet bgs. Soil cuttings will be field screened while drilling using a PID. Samples for laboratory analysis will be selected based on field screening results. Containerized soil cuttings from boreholes will be left at the drill site until the laboratory analytical data is available. If the soil does not contain any hazardous constituents at concentrations exceeding risk-based soil criteria for Westover ARB's MTF, then the soil cuttings will be spread on the ground surface near the boreholes.

If the analytical results indicate contaminant levels exceed the risk-based soil criteria, the containerized drill cuttings will be properly labeled, transported to a waste storage

area, and managed appropriately. The costs associated with waste disposal is the responsibility of Parsons ES. If the risk-based soil criteria are exceeded, it is expected that containerized soil from the site will be classified as Petroleum Contaminated Soil and will be disposed of at a landfill licensed to accept these wastes. Based on analytical results, drill cuttings which either contain a listed hazardous waste or sufficient hazardous constituents that they exhibit hazardous waste characteristics will be disposed of at a licensed treatment, storage, disposal, and recycling (TSDR) facility.

6.2.2 Personal Protective and Disposable Sampling Equipment

Confirmation soil sampling equipment and clothing which becomes contaminated, and will not be reused, will be containerized for offsite disposal. Examples of PPE include latex gloves and Tyvek® suits. Sample bottles and plastic sheeting are examples of disposable sampling equipment. These materials represent solid waste and will be considered hazardous waste if they are suspected to be contaminated with listed wastes. These materials will be containerized and managed in accordance with Massachusetts policies for IDW.

6.2.3 Decontamination/Equipment Rinseate Water

Water generated during decontamination of drill rigs will be collected, placed into storage drums and labeled appropriately. These materials will be managed in accordance with Massachusetts policies for IDW.

6.3 Waste Inventory, Tracking, And Reporting

All solid materials generated from confirmation soil sampling activities and classified as containing hazardous or petroleum contaminated waste, will be managed using "cradle-to-grave" tracking procedures. Formal documentation of the waste stream will commence when a container is placed into service. A container is placed into service when it is assigned an accumulation start date, a unique identification number, and a waste tracking inventory sheet. The waste tracking inventory sheet is initiated when a container is placed into service. Entries are made on the waste tracking inventory sheet in the information section as waste is added to the container, or if the container is moved to a new location. This information allows the identification of all containers in service and the number of days left on each container's 90-day clock. The inventory sheet is completed and the unique identification number is closed when the waste is treated, consolidated, or shipped to a commercial TSDR, or other licensed waste disposal facility, depending on the waste classification.

Establishment of a waste stream profile sheet requires preparation of a commercial TSDR facility, or other licensed waste disposal facility, profile information sheet. The characterization information that must be entered on the form is required by the disposal facility to profile and accept the waste. When a shipment is made, a Uniform Hazardous Waste Manifest or appropriate State manifest is prepared and accompanies each shipment to the disposal facility. This record includes the generator copy of the manifest which is replaced by the original copy upon return, including the commercial disposal facility representative's signature. Manifest information is added to the waste tracking inventory sheet. Disposal of all waste will be coordinated and funded by Parsons ES. However, it will be the responsibility of Westover ARB to sign the manifest and any other appropriate forms.

SECTION 7
BASE SUPPORT REQUIREMENTS

The following Westover ARB support is needed prior to the arrival of the drillers and the Parsons ES team:

- Assistance in obtaining drilling and digging permits.
- Arrangement of site access for Parsons ES and the drilling subcontractor.
- Provision of an acceptable area for equipment decontamination.
- Provision of a potable water supply for decontamination activities.
- Assistance in disposing waste materials.

SECTION 8
PROJECT SCHEDULE

The following schedule is contingent upon approval of this closure sampling and analysis plan and completion of Westover ARB's support requirements.

EVENT	DATE
Submit draft closure SAP to AFCEE and Westover ARB	10 January 1997
Receipt of AFCEE and Westover ARB comments	14 February 1997
Submit draft final SAP to AFCEE, Westover ARB, and Massachusetts DEP	28 February 1997
Receipt of Massachusetts DEP comments	28 March 1997
Submit final SAP to AFCEE, Westover ARB, and Massachusetts DEP	11 April 1997
Begin confirmatory soil sampling	5 May 1997
Submit draft confirmatory soil sampling report to AFCEE and Westover ARB	27 June 1997
Receipt of AFCEE and Westover ARB's comments	11 July 1997
Submit final confirmatory soil sampling and Response Action Outcome report to AFCEE Westover ARB and Massachusetts DEP	25 July 1997

SECTION 9
POINTS OF CONTACT

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Licensed Site Professional
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Boston, Massachusetts 02199
(617) 859-2000

SECTION 10
REFERENCES

Environmental Compliance Services, Inc. 1994. Immediate Response Action Plan, Medical Training Facility, Westover ARB, Chicopee, Massachusetts. Prepared for Mr. Hank Lemanski, Operational Contacting Office, Westover ARB. Agawam, Massachusetts. November.

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APPENDIX

RESPONSE TO COMMENTS ON DRAFT AND DRAFT FINAL CLOSURE SAMPLING AND ANALYSIS PLAN

RESPONSE TO AFCEE, WESTOVER ARB AND MASSACHUSETTS DEP COMMENTS TO THE DRAFT FINAL CLOSURE SAP FOR THE MEDICAL TRAINING FACILITY SITE, WESTOVER ARB, MASSACHUSETTS

These responses have been prepared to address AFCEE, Westover Air Reserve Base (ARB) and Massachusetts Department of Environmental Protection (DEP) comments made to the Draft Final Closure Sampling and Analysis Plan (SAP) for the Medical Training Facility site at Westover ARB, Massachusetts. Each AFCEE, Westover ARB and Massachusetts DEP comment is shown below in italics with the corresponding response below each comment.

AFCEE Comments:

Please place the written comments and responses in the Appendix of the Final Closure SAP.

Done.

Westover ARB Comments:

1. *Cover & Cover Page: The report has been prepared for AFCEE and for 439th Support Group/439th Airlift Wing, not the 439th Civil Engineering Squadron.*

   The cover and cover page have been revised.

2. *Page 3-2: Information on Robert Kane, LSP, should include his License Number.*

   Robert Kane's LSP License Number has been added to pages 3-2 and 9-1.

Massachusetts DEP Comments:

1. *As proposed in this report, depending on the sampling results this site may be eligible for a Class A-2 or A-3 RAO statement. If an AUL is deemed necessary (Class A-3) for this site, it (the AUL) must be in place prior to the submittal of the RAO. It should also be noted that an AUL is not necessary at disposal sites where residual contamination is located at a depth greater than 15 feet from the ground surface (310 CMR 40.1012 (3)(b)).*

   No comment necessary.

2. *Parsons should document on a site map the portion of the disposal site for which the RAO applies, pursuant to 310 CMR 40.1003 (4). The map should show dimensions from buildings, depth, other benchmarks or surveyed property lines. A person should be able to go to the site in the future and be able to accurately find the RAO area.*

   In response to this comment, a bullet item has been added to Section 5 - Response Action Completion Report stating that "a site map documenting the portion of the

disposal site for which the RAO applies (will be included) . . . This map will include dimensions from buildings, depth, and other benchmarks or surveyed property lines to sufficiently define the RAO area."

3. *Previous groundwater results should be documented in the RAO statement. Also, all reasoning for not resampling/further assessing (i.e. why Parsons states that the groundwater was not "significantly impacted") the groundwater at the site should be stated in the RAO statement.*

   A discussion will be included in the RAO and the Response Action Completion Report describing the reasoning for not resampling/further assessing the groundwater at the MTF site.

4. *When a Permanent Solution has been implemented at a disposal site, a Class A RAO applies to the site (310 CMR 40.1035). The implementation of a permanent solution must be accompanied by an evaluation of the feasibility of reducing OHM levels to background. For a class A-2 or A-3 you must demonstrate that the achievement of background is not feasible (310 CMR 40.1056 (2)(e)). Either site specific background samples or MADEP published background levels should be obtained or used.*

   The collection of a background sample has been added to the sampling and analysis plan in Section 4. One background sample will be collected from an area southeast of the MTF site. This sample will be collected at a depth interval of 2 to 4 feet using a hand auger. The sample will be analyzed for TPH by USEPA Method 418.1, volatile petroleum hydrocarbons (VPH) and extractable petroleum hydrocarbons (EPH) by USEPA Method SW8015 Modified. MADEP published background levels will be used for comparison with benzene, toluene, ethylbenzene and xylene (BTEX) and polyaromatic hydrocarbons present at the site.

5. *Relative information on using the new EPH/VPH Method 1 Standards can be found by calling the MCP Helpline (617) 338-2255 or by accessing DEP on the World Wide Web: http://www.magnet.state.a.us/dep. Related papers on EPH/VPH:*
   May 1996: "Issues Paper: Implementation of VPH/EPH Approach"
   Nov. 1, 1996: Proposed Changes to the MCP Numerical Standards
   Jan. 15, 1997: Letter from Jim Colman to LSPs and Interested Parties. (Letter discusses the status of DEP's VPH/EPH approach and methodologies.

   Any questions on the VPH/EPH approach should be directed to John Fitzgerald at (617) 932-7702 or jfitzgerald@stte.ma.us.

   No comment necessary.

6. *As stated in the report, "the angled boreholes will be drilled at approximately a 45 degree angle, beginning 15 feet away from the building foundation." These boreholes will be completed to 30 feet below the ground surface, and 15 feet within the building foundation." On Figure 4-1 (soil sampling location) it appears that this will give you a sample at 15 feet under the foundation or in the middle of where the UST used to be located. How will the east (far) side of the*

former UST location be sampled? Will the entire "extent of the contamination" be defined for the RAO? The extent of the RAO should be documented vertically and horizontally.

The east end of the former UST area was sampled during an investigation by Tighe and Bond, Inc. in December 1994, location B-4 on Figure 2-2. This soil sample was collected from the 40 to 42 foot depth interval, was analyzed, and detected BTEX compounds below the method detection limit and TPH concentrations of less than 55 mg/kg. In addition, to further document the extent of contamination for the RAO, Parsons ES installed a soil vapor monitoring point (MPC) on the east end of the former UST location in April 1995. This location has shown low concentrations of field analyzed total volatile hydrocarbons (TVH) (less than 75 ppm). Therefore, Parsons ES excluded the collection and analysis of soil from this area because soil and soil gas samples have been collected from this area previously and the results showed low levels of contamination.

RESPONSE TO AFCEE AND WESTOVER ARB COMMENTS TO DRAFT CLOSURE SAP FOR THE MEDICAL TRAINING FACILITY SITE, WESTOVER ARB, MASSACHUSETTS

These responses have been prepared to address AFCEE and Westover ARB comments made to the Draft Closure SAP for the Medical Training Facility site at Westover ARB, Massachusetts. Each AFCEE and Westover ARB comment is shown below in italics with the corresponding response below each comment.

AFCEE Comments:

1. *Figure 2.3. All the following refer to the field and lab sample:*
   a. Indicate in the legend text that the lab data are gas samples
   b. Are the lab data ppmv or ppm?
   c. Please be consistent in upper/lower case. Field data is ppmv and lab data is PPM.

   a. The following change has been made to the legend on Figure 2.3; "soil gas field screening results" has been added to replace "field screening results" in the legend on Figure 2.3.
   b. A note was added in the legend on Figure 2.3 that laboratory results are in milligrams per kilogram.
   c. All upper case PPMs were changed to lower case.

2. *Page 4-1, Section 4.1, First line in text. Replace "horizontal" with "angled"*

   Done.

3. *Please verify with the Army CoE folks about the proposed procedures to refill the angled borings. I just want to make sure that there is no question about altering the foundation's integrity by improperly refilling the boreholes. They may call for filling with tremie tubes and cement (as an example) or they may say that the holes are so small that there won't be any structural impacts (hopefully). Please get their input in writing.*

   The Medical Training Facility is now the responsibility of Westover ARB Civil Engineering. The Base Civil Engineer and CEV personnel stated in a fax sent to Mr. John Mastracchio (Parsons ES) on February 13, 1997 that they have no objections with the proposed angled drilling under the building. They further clarified in a second fax sent to Mr. Mastracchio on February 26, 1997 that the holes would not have any structural impact to the building and backfilling with cement grout will not be necessary.

Westover ARB Comments:

1. *p.3-1, Sec. 3 Include in this section that a project Licensed Site Professional (LSP) will be employed to advise on and approve of the site cleanup requirements. You may want to include information on the LSP (such as name, license number, etc.) in a later section (appendix). This person will become the*

new LSP of Record on this project.

A paragraph has been added to Section 3-1 stating that the new LSP is Robert Kane, that he will review all pertinent site documents, and approve of the site closure requirements. Information on the LSP is included in Section 9, Points of Contact.

2. *If you have employed an LSP, has this person reviewed this work plan?*

   Yes. Robert Kane has reviewed the Draft Closure SAP and has provided comments in support of the Draft Final Closure SAP.

3. *p. 3-2, Last Paragraph Include a qualifying statement to the effect that the Class RAO will depend upon the results of the sampling.*

   The following sentence has been added to the last paragraph on p. 3-2; "The Class RAO (i.e. Class A-2 or Class A-3) at the MTF will depend on the results of the soil sampling."

4. *p.4.2, Sec. 4.2 Check with the project LSP on whether the EPH/VPH analytical method would be helpful or appropriate to use. (The Massachusetts Department of Environmental Protection appears to be in favor of Potentially Responsible Parties using this method rather than the Total Petroleum Hydrocarbon analysis).*

   Although the Massachusetts DEP does not currently require EPH/VPH analysis, it does appear to be gaining their favor. It is possible that in the future EPH/VPH analysis may be required for closure of petroleum contaminated sites. Therefore, EPH/VPH analysis has been added for five of the soil samples we will be collecting. Three of the samples to be analyzed for EPH/VPH will be collected from the angle borings and two will be collected from the vertical borings. These changes have been incorporated into Section 4.2 Analytical Methods and Table 4.1.

5. *p. 5.1, Sec. 5 The first sentence should read similar to the following: "Following receipt of the laboratory analytical results, a Draft Response Action Completion Report and a Response Action Outcome Statement will be prepared by a Licensed Site Professional and will be submitted to Westover ARB and AFCEE.*

   Revised.

6. *p. 6-3 Waste Inventory, Tracking, and Reporting: Specify who will be funding the costs of any hazardous waste generated as a result of the completion of this project.*

   The following statement has been added to p. 6-3; "Disposal of all waste will be funded and coordinated by Parsons ES, however, it will be the responsibility of Westover ARB to sign the manifest and any other appropriate forms."

APPENDIX C

BORING LOGS

Contractor: American
Driller: Kenneth Byland
Inspector: J.M. Mastracchio
Rig Type: CME, 4.25" HSA

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. B-1 Sheet 1 of 2

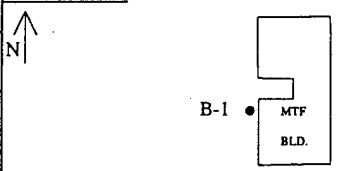
Location Description:

PROJECT NAME: Westover ARB - MTF
PROJECT NUMBER 726876.37120, Contract #F41624-92-D-8036, DO17

GROUNDWATER OBSERVATIONS				
Water Level				
Date				
Time				
Meas. From				

Weather: Cloudy, 60s
Date/Time Start: May 20, 1997 / 0930
Date/Time Finish: May 20, 1997 / 1220

Location Plan



Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
0-14							
15		1					
		3		34	M/F, brn, SAND, dry		Sample collected WEMTF-B1-15-17
16		5					
		6					
17		3					
		10		20.9	M/F, brn, SAND, dry		
18		13					
		12					
19		5					
		7		30.2	M/F, brn, SAND, dry		
20		6					
		6					
21		3					
		4		35.6	M/F, brn, SAND, dry		Sample collected WEMTF-B1-21-23
22		8					
		8					
23		5					
		7		23.2	M/F, brn, SAND, dry		
24		9					
		9					
25		5					
		7		11.5	M/F, brn, SAND, dry		
26		10					
		14					
27		23					
		33		5.8	M/F, brn, SAND, dry		
28		17					
		16					
29		7					
		25		17.8	M/F, brn, SAND, moist		
30		35					
		30					
31		40					
		25		9.7	M/F, brn, SAND, moist		
32		30					
		43					
33							
				6.8	M/F, brn, SAND with Trace GRAVEL, moist		

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:

Contractor: American Driller: Kenneth Byland Inspector: J.M. Mastracchio Rig Type: CME, 4.25" HSA	**PARSONS ENGINEERING SCIENCE, INC.** **DRILLING RECORD** **PROJECT NAME:** Westover ARB - MTF **PROJECT NUMBER** 726876.37120, Contract #F41624-92-D-8036, DO17	**BORING/ WELL NO.** B-1 Sheet 2 of 2 **Location Description:**

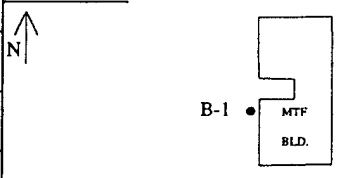
GROUNDWATER OBSERVATIONS				
Water Level				
Date				
Time				
Meas. From				

Weather: Cloudy, 60s

Date/Time Start: May 20, 1997 / 0930

Date/Time Finish: May 20, 1997 / 1220

Location Plan



Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
34							
35							
				17	M/F, brn, SAND with Trace GRAVEL, moist		
36							
37							
				1	M/F, brn, SAND with Trace GRAVEL, wet		
38							
39							
					End of Boring		

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:

Contractor: American Driller: Kenneth Byland Inspector: J.M. Mastracchio Rig Type: CME, 4.25" HSA	**PARSONS ENGINEERING SCIENCE, INC.** **DRILLING RECORD** PROJECT NAME: Westover ARB - MTF PROJECT NUMBER 726876.37120, Contract #F41624-92-D-8036, DO17	**BORING/ WELL NO. B-2** Sheet 1 of 2 Location Description:

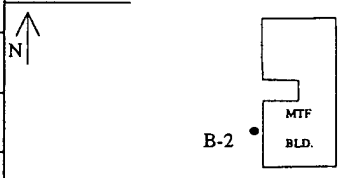
GROUNDWATER OBSERVATIONS				
Water Level				
Date				
Time				
Meas. From				

Weather: Cloudy, 60s

Date/Time Start: May 19, 1997 / 1400

Date/Time Finish: May 20, 1997 / 0920

Location Plan



Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
0-14							
15		1					
		3		0	M/F, brn, SAND, dry		
16		4					
		5					
17		4					
		5		0	M/F, brn, SAND, dry		
18		6					
		10					
19		4					
		5		0	M/F, brn, SAND, dry		
20		10					
		12					
21		4					
		6		0	M/F, brn, SAND, slightly stained, dry		
22		8					
		8					
23		6					
		12		0	M/F, brn, SAND, dry		
24		15					
		17					
25		12					
		20		0	M/F, brn, SAND, dry		
26		25					
		21					
27		21					
		20		12.3	M/F, brn, SAND, dry		
28		18					
		16					
29		10					
		30		120	M/F, brn, SAND, slightly stained, moist		Sample collected WEMTF-B2-29-31
30		38					
		37					
31		27					
		30		45.9	M/F, brn, SAND, moist		
32		30					
		22					
33		8					
		14		109	M/F, brn, SAND, moist		

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:

Contractor: American
Driller: Kenneth Byland
Inspector: J.M. Mastracchio
Rig Type: CME, 4.25" HSA

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. B-2 Sheet 2 of 2

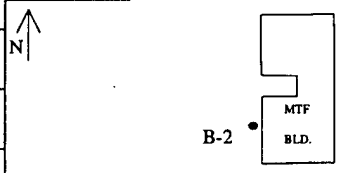
Location Description:

PROJECT NAME: Westover ARB - MTF
PROJECT NUMBER 726876.37120, Contract #F41624-92-D-8036, DO17

GROUNDWATER OBSERVATIONS				
Water Level				
Date				
Time				
Meas. From				

Weather: Cloudy, 60s
Date/Time Start: May 19, 1997 / 1400
Date/Time Finish: May 20, 1997 / 0920

Location Plan



Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
34		16					
		21					
35		7					
		17		57	M/F, brn, SAND, moist		
36		25					
		29					
37		30					
		35		40.9	M/F, brn, SAND, moist		Sample Collected WEMTF-B2-37-39 WEMTF-B2-37-39DUP
38		16					
		19			Wet at 38.5'		
39					End of Boring		

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:

Contractor: American Driller: Kenneth Byland Inspector: J.M. Mastracchio Rig Type: CME, 4.25" HSA	**PARSONS ENGINEERING SCIENCE, INC.** DRILLING RECORD **PROJECT NAME:** Westover ARB - MTF **PROJECT NUMBER** 726876.37120, Contract #F41624-92-D-8036, DO17	BORING/ WELL NO. B-3 Sheet 1 of 2 Location Description:

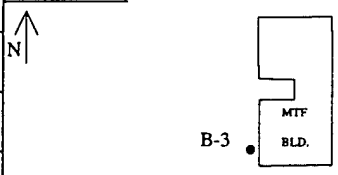
GROUNDWATER OBSERVATIONS				
Water Level				
Date				
Time				
Meas. From				

Weather: Cloudy, 60s

Date/Time Start: May 19, 1997 / 1150

Date/Time Finish: May 20, 1997 / 1320

Location Plan



Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
0-14							
15		3					
		5		0	M/F, brn, SAND, dry		
16		6					
		5					
17		4					
		4		0	M/F, brn, SAND, dry		
18		7					
		9					
19		4					
		4		0	M/F, brn, SAND, dry		
20		8					
		10					
21		10					
		8		0	M/F, brn, SAND, dry		
22		7					
		10					
23		4					
		6		0	M/F, brn, SAND, dry		
24		10					
		11					
25		12					
		24		0	M/F, brn, SAND, dry		
26		25					
		15					
27		20					
		20		0	M/F, brn, SAND, dry		
28		16					
		10					
29		20					
		35		0.8	M/F, brn, SAND, dry		
30		40					
		43					
31		25					
		27		1.3	M/F, brn, SAND, moist		Sample Collected WEMTF-B3-31-33
32		27					
		27					
33		14					
		19		0.9	M/F, brn, SAND, moist		

COMMENTS:

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

Contractor: American
Driller: Kenneth Byland
Inspector: J.M. Mastracchio
Rig Type: CME, 4.25" HSA

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. B-3 Sheet 2 of 2

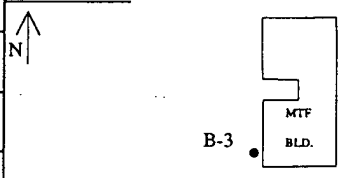
Location Description:

PROJECT NAME: Westover ARB - MTF
PROJECT NUMBER 726876.37120, Contract #F41624-92-D-8036, DO17

GROUNDWATER OBSERVATIONS				
Water Level				
Date				
Time				
Meas. From				

Weather: Cloudy, 60s
Date/Time Start: May 19, 1997 / 1150
Date/Time Finish: May 20, 1997 / 1320

Location Plan



Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
34		23					
		18					
35		10					
		19		1.3	M/F, brn, SAND, moist		Sample Collected WEMTF-B3-35-37
36		18					
		19					
37		4					
		6		1.2	M/F, brn, SAND with Trace GRAVEL, Wet		
38		7					
		6					
39							
					End of Boring		

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:

Contractor: American
Driller: Kenneth Byland
Inspector: J.M. Mastracchio
Rig Type: CME, 4.25" HSA

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. AB-1 Sheet 1 of 2

Location Description:

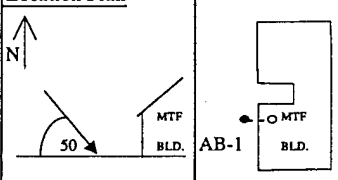
PROJECT NAME: Westover ARB - MTF
PROJECT NUMBER 726876.37120, Contract #F41624-92-D-8036, DO17

GROUNDWATER OBSERVATIONS

Water Level				
Date				
Time				
Meas. From				

Weather: Sunny, 60s
Date/Time Start: May 22, 1997 / 1315
Date/Time Finish: May 23, 1997 / 1515

Location Plan



Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
0							
1							
2							
3							
4							
5							
				0	M/F, brn, SAND, dry		
6							
7							
8				0	M/F, brn, SAND, dry		
9							
10							
				0	M/F, brn, SAND, dry		
11							
12							
13					M/F, brn, SAND, dry		
				0			
14							
15							
				103	M/F, brn, SAND, dry		
16							
17							
18				173	M/F, brn, SAND, dry		
19							
20							
				94.6	M/F, brn, SAND		

COMMENTS:

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

Contractor: American	PARSONS ENGINEERING SCIENCE, INC.	BORING/ Sheet 2 of 2
Driller: Kenneth Byland	DRILLING RECORD	WELL NO. AB-1
Inspector: J.M. Mastracchio	PROJECT NAME: Westover ARB - MTF	Location Description:
Rig Type: CME, 4.25" HSA	PROJECT NUMBER 726876.37120, Contract #F41624-92-D-8036, DO17	

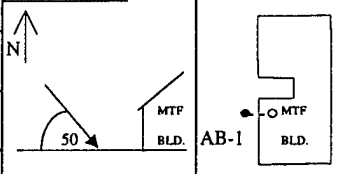
GROUNDWATER OBSERVATIONS				
Water Level				
Date				
Time				
Meas. From				

Weather: Sunny, 60s

Date/Time Start: May 22, 1997 / 1315

Date/Time Finish: May 23, 1997 / 1515

Location Plan



Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
21							
22							
23				157	M/F, brn, slightly stained,SAND,dry		Sample Collected WEMTF-AB1-23-25
24							
25							
				31.8	M/F, brn, SAND, dry		
26							
27							
28				101	M/F, brn, SAND, dry		
29							
30							
				32.8	M/F, brn, SAND, dry		
31							
32							
33				33.6	M/F, brn, SAND, dry		Sample Collected WEMTF-AB1-33-35
34							
35					End of Boring		
36							
37							
38							
39							
40							

COMMENTS:

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

Contractor: American
Driller: Kenneth Byland
Inspector: J.M. Mastracchio
Rig Type: CME, 4.25" HSA

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. AB-2 Sheet 1 of 2

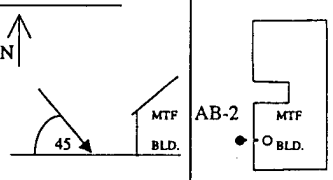
Location Description:

PROJECT NAME: Westover ARB - MTF
PROJECT NUMBER 726876.37120, Contract #F41624-92-D-8036, DO17

GROUNDWATER OBSERVATIONS				
Water Level				
Date				
Time				
Meas. From				

Weather: Sunny, 60s
Date/Time Start: May 22, 1997 / 0700
Date/Time Finish: May 22, 1997 / 1145

Location Plan



Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
				1	M/F, brn, SAND, dry		
11							
12							
13				9.3	M/F, brn, SAND, dry		
14							
15							
				39.6	M/F, brn, SAND, dry		
16							
17							
18				54.2	M/F, brn, SAND, dry		
19							
20							
				60.5	M/F, brn, slightly stained SAND		

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:

Contractor: American
Driller: Kenneth Byland
Inspector: J.M. Mastracchio
Rig Type: CME, 4.25" HSA

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. AB-2 Sheet 2 of 2

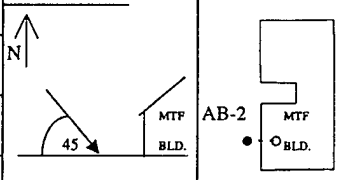
Location Description:

PROJECT NAME: Westover ARB - MTF
PROJECT NUMBER 726876.37120, Contract #F41624-92-D-8036, DO17

GROUNDWATER OBSERVATIONS				
Water Level				
Date				
Time				
Meas. From				

Weather: Sunny, 60s
Date/Time Start: May 22, 1997 / 0700
Date/Time Finish: May 22, 1997 / 1145

Location Plan



Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
21							
22							
23				50.1	M/F, brn, slightly stained,SAND,dry		
24							
25							
				94.4	M/F, brn, SAND, dry		
26							
27							
28				101	M/F, brn, SAND, dry		Sample Collected WEMTF-AB2-28-30
29							
30							
				99	M/F, brn, slightly stained, SAND, dry		
31							
32							
33				92	M/F, brn, slightly stained, SAND, dry		
34							
35							
				75	M/F, brn, SAND, dry		
36							
37							
38				234	M/F, brn, slightly stained, SAND, dry		Sample Collected WEMTF-AB2-38-40
39					End of Boring		
40							

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:

Contractor: American
Driller: Kenneth Byland
Inspector: J.M. Mastracchio
Rig Type: CME, 4.25" HSA

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. AB-3 Sheet 1 of 2

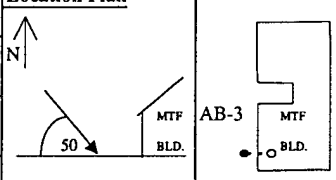
Location Description:

PROJECT NAME: Westover ARB - MTF
PROJECT NUMBER 726876.37120, Contract #F41624-92-D-8036, DO17

GROUNDWATER OBSERVATIONS				
Water Level				
Date				
Time				
Meas. From				

Weather: Cloudy, 60s
Date/Time Start: May 20, 1997 / 1345
Date/Time Finish: May 21, 1997 / 1445

Location Plan



Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
0							
1							
2							
3				0	M/F, brn, SAND, dry		
4							
5							
				0	M/F, brn, SAND, dry		
6							
7							
8				0.5	M/F, brn, SAND, dry		
9							
10							
				0	M/F, brn, SAND, dry		
11							
12							
13				0	M/F, brn, SAND, dry		
14							
15							
				0	M/F, brn, SAND, dry		
16							
17							
18				0	M/F, brn, SAND, dry		
19							
20							
				23.9	M/F, brn, slightly stained,SAND		

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:

Contractor: American
Driller: Kenneth Byland
Inspector: J.M. Mastracchio
Rig Type: CME, 4.25" HSA

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. AB-3 Sheet 2 of 2

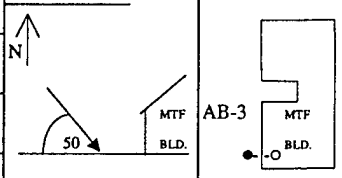
Location Description:

PROJECT NAME: Westover ARB - MTF
PROJECT NUMBER 726876.37120, Contract #F41624-92-D-8036, DO17

GROUNDWATER OBSERVATIONS				
Water Level				
Date				
Time				
Meas. From				

Weather: Cloudy, 60s
Date/Time Start: May 20, 1997 / 1345
Date/Time Finish: May 21, 1997 / 1445

Location Plan



Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	SCHEMATIC	COMMENTS
21							
22							
23				68.8	M/F, brn, slightly stained,SAND,dry		
24							
25							
				41.7	M/F, brn, SAND, dry		
26							
27							
28				26.9	M/F, brn, SAND, dry		
29							
30							
				121	M/F, brn, stained SAND, dry		
31							
32							
33				263	M/F, brn, SAND, dry		Sample Collected WEMTF-AB3-33-35
34							
35							
				306	M/F, brn, slightly stained SAND, dry		
36							
37							
38				293	M/F, brn, slightly stained SAND, dry		Sample Collected WEMTF-AB3-38-40
39							
40					End of Boring		

COMMENTS:

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

APPENDIX D

LABORATORY ANALYTICAL RESULTS

ITS **Intertek Testing Services**
Environmental Laboratories

SAMPLE DATA SUMMARY PACKAGE

CONTRACT: 97000
CASE NO: 97000
SDG NO: 65012

ITS Intertek Testing Services
Environmental Laboratories

June 19, 1997

Mr. John Ratz
Parsons Engineering Science
1700 Broadway, Suite 900
Denver, CO 80290

Re: Laboratory Project No. 97000
Case No: 97000; SDG 65012

Dear Mr. Ratz:

Enclosed are the analytical results of samples received by ITS Environmental Laboratories on May 21, 1997 and May 23, 1997. Laboratory numbers and quality control samples have been assigned and designated as follows:

Lab ID	Client Sample ID	Sample Date	Sample Matrix
	Received: 05/21/97 ETR No: 65012		
331110	B331	05/19/97	Soil
331111	B335	05/19/97	Soil
331112	B229	05/20/97	Soil
331112MS	B229MS	05/20/97	Soil
331112MSD	B229MD	05/20/97	Soil
331112DP	B229REP	05/20/97	Soil
331113	B229	05/20/97	MeOH
331113MS	B229MS	05/20/97	MeOH
331113MSD	B229MD	05/20/97	MeOH
331114	B237	05/20/97	Soil
331115	B237D	05/20/97	Soil
331116	B115	05/20/97	Soil
331117	B121	05/20/97	Soil
331118	B121	05/20/97	Soil
331119	BAK	05/20/97	Soil
331120	BAK	05/20/97	MeOH
	Received: 05/23/97 ETR No: 65046		
331370	AB333	05/21/97	Soil
331371	AB338	05/21/97	Soil
331372	AB338	05/21/97	MeOH
331373	AB228	05/22/97	Soil

Intertek Testing Services NA Inc.
55 South Park Drive Colchester, VT 05446
Telephone (802) 655-1203 Fax (802) 655-1248

X01

Lab ID	Client Sample ID	Sample Date	Sample Matrix
	Received: 05/23/97 ETR No: 65046 (cont.)		
331374	AB238	05/22/97	Soil
331375	AB238	05/22/97	MeOH
331376	AB123	05/22/97	Soil
331377	AB123	05/22/97	MeOH
331378	AB133	05/22/97	Soil
331379	TRIP-1	05/22/97	MeOH
331380	TRIP BLANK		MeOH

Due to software field size limitations, all sample identifications were truncated. It should be noted that all dashes and "WEMTF" were omitted from each sample identification.

In the polynuclear aromatic analysis by Method 8310, the matrix spike samples, B229MS and B229MSD exhibited high recoveries of early eluting polynuclear aromatic compounds. This interference was due to the presence of diesel fuel in the parent sample, B229.

Late eluting hydrocarbons were detected in all samples in the BTEX analyses by Method 8020. The samples labeled AB333, AB338, AB228, AB238, AB123 and AB133 required medium level methanol extractions based on laboratory screen results.

In the volatile petroleum hydrocarbon (VPH) analyses, the surrogate and matrix spike recoveries for all samples excluding laboratory blanks and control samples exceeded the control limits. The recoveries were due to interferences from high concentrations of hydrocarbons in the region of diesel fuel that were present in each sample. All samples were originally analyzed within the established holding time and then reanalyzed at a date outside of holding time. Recoveries from the original analyses and the reanalyses were comparable. Both sets of data have been provided for each sample.

The responses of several analytes in the continuing calibration standards exhibited percent differences that exceeded the control limits. The high concentration of hydrocarbons present in these samples also interfered with the continuing calibration standards.

The samples received on May 23, 1997 were extracted outside the established holding time for the extractable petroleum hydrocarbon (EPH) analyses. The holding time for the MADEP EPH method is 7 days from sample receipt. These samples were extracted 13-14 days from sample collection.

The EPH analyses of the sample labeled B229 and its associated matrix spike samples, were analyzed at five fold dilutions. Consequently, several matrix spike analytes were diluted to concentrations below reporting limits and therefore not reported.

The laboratory was unable to provide data for the MADEP EPH and VPH methods on the requested IRPIMS diskette. At this time, the format of the IRPIMS disk has no provisions for these two methods.

If there are any questions regarding this submittal, please contact Lori Arnold at (802) 655-1203.

Sincerely,

Karen R. Chirgwin
Laboratory Operations Director

cc: John Mastracchio - Parsons E.S.

KRC/cga
Enclosure

002A

ITS Intertek Testing Services
Environmental Laboratories

55 South Park Drive
Colchester, VT 05446

Analytical Report

Parsons Engineering Science
1700 Broadway, Suite 900
Denver, CO 80290

Date : 06/02/97
ETR Number : 65012
Project No.: 97000
No. Samples: 16
Arrived : 05/21/97

Attention : John Ratz

CC Results to : John Mastracchio

Case:97000 SDG:65012

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater.
All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
331110	B331:05/19/97 (Soil)	
418.1	Petroleum Hydrocarbons	<28.1 f
IN623	Solids, Percent	87.2 c
331111	B335:05/19/97 (Soil)	
418.1	Petroleum Hydrocarbons	<26.3 f
IN623	Solids, Percent	88.6 c
331112	B229:05/20/97 (Soil)	
418.1	Petroleum Hydrocarbons	1930 f
IN623	Solids, Percent	94.0 c
331112MS	B229MS:[MS]05/20/97 (Soil)	
IN623	Solids, Percent	94.0 c
418.1	Petroleum Hydrocarbons	4630 f
331112MD	B229MSD:[MSD]05/20/97 (Soil)	
IN623	Solids, Percent	94.0 c
331112DP	B229REP:[REP]05/20/97 (Soil)	
IN623	Solids, Percent	93.6 c
418.1	Petroleum Hydrocarbons	1950 f

Comments/Notes

f = mg/Kg dry weight
c = %W/W as received

< Cont. Next Page >

ITS Intertek Testing Services
Environmental Laboratories

55 South Park Drive
Colchester, VT 05446

Analytical Report

Parsons Engineering Science
1700 Broadway, Suite 900
Denver, CO 80290

Date : 06/02/97
ETR Number : 65012
Project No.: 97000
No. Samples: 16
Arrived : 05/21/97

Attention : John Ratz

CC Results to : John Mastracchio

Case:97000 SDG:65012

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater.
All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
331114	B237:05/20/97 (Soil)	
418.1	Petroleum Hydrocarbons	37.5 f
IN623	Solids, Percent	92.7 c
331115	B237D:05/20/97 (Soil)	
418.1	Petroleum Hydrocarbons	<27.6 f
IN623	Solids, Percent	86.2 c
331116	B115:05/20/97 (Soil)	
418.1	Petroleum Hydrocarbons	2400 f
IN623	Solids, Percent	91.6 c
331117	B121:05/20/97 (Soil)	
418.1	Petroleum Hydrocarbons	97.5 f
IN623	Solids, Percent	84.7 c
331119	BAK:05/20/97 (Soil)	
418.1	Petroleum Hydrocarbons	<24.9 f
IN623	Solids, Percent	95.9 c

Comments/Notes

f = mg/Kg dry weight
c = %W/W as received

< Last Page > Submitted By : Aquatec Inc.

ITS Intertek Testing Services
Environmental Laboratories

55 South Park Drive
Colchester, VT 05446

Analytical Report

Parsons Engineering Science
1700 Broadway, Suite 900
Denver, CO 80290

Date : 06/06/97
ETR Number : 65046
Project No.: 97000
No. Samples: 11
Arrived : 05/23/97

Attention : John Ratz

CC Results to : John Mastracchio

Case:97000 SDG:65012 Westover-WTF

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater.
All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
331370	AB333:05/21/97 (Soil)	
418.1	Petroleum Hydrocarbons	14100 f
IN623	Solids, Percent	84.9 c
331371	AB338:05/21/97 (Soil)	
418.1	Petroleum Hydrocarbons	1810 f
IN623	Solids, Percent	91.1 c
331373	AB228:05/22/97 (Soil)	
418.1	Petroleum Hydrocarbons	9350 f
IN623	Solids, Percent	90.8 c
331374	AB238:05/22/97 (Soil)	
418.1	Petroleum Hydrocarbons	15300 f
IN623	Solids, Percent	79.1 c
331376	AB123:05/22/97 (Soil)	
418.1	Petroleum Hydrocarbons	5120 f
IN623	Solids, Percent	89.2 c
331378	AB133:05/22/97 (Soil)	
418.1	Petroleum Hydrocarbons	125 f
IN623	Solids, Percent	95.0 c

Comments/Notes

f = mg/Kg dry weight
c = %W/W as received

< Last Page > Submitted By : Aquatec Inc.

ITS Intertek Testing Services
Environmental Laboratories

Quality Control Summary

Project No: 97000
SDG No: 65012
Units: mg/L

Parameter	Date Analyzed	Method Preparation Blank	Laboratory Control Sample		
			Reported Value	True Value	Percent Recovery
Total Petroleum Hydrocarbons	05/23/97	< 0.25	27.5	28.3	97.2
Total Petroleum Hydrocarbons	06/03/97	< 0.26	27.7	28.3	97.9

Reviewed By: MRJ
Date: 6/6/97

Intertek Testing Services NA Inc.
55 South Park Drive Colchester, VT 05446
Telephone (802) 655-1203 Fax (802) 655-1248

ITS Intertek Testing Services
Environmental Laboratories

Quality Control Summary

Project No: 97000
SDG No: 65012
Sample No: 331112
Units: mg/Kg

Parameter	Date Analyzed	Sample Result	Duplicate Sample Result	Relative Percent Difference	Spiked Sample Result	Spike Added	Percent Spike Recovery
Total Petroleum Hydrocarbons	05/23/97	1930	1950	1.0	4630	2850	94.7

Rev'd By: MLH
Date: 6/2/97

Intertek Testing Services NA Inc.
55 South Park Drive Colchester, VT 05446
Telephone (802) 655-1203 Fax (802) 655-1248

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

AB123

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331376

Sample wt/vol: 4.0 (g/mL) G Lab File ID: 03JUN970143-I101

Level: (low/med) MED Date Received: 05/23/97

% Moisture: not dec. 11 Date Analyzed: 06/03/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10(ml) Soil Aliquot Volume: 40(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	180	U
108-88-3	Toluene	180	U
100-41-4	Ethylbenzene	180	U
----------	p/m-Xylene	350	U
95-47-6	o-Xylene	180	U

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

AB133

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331378

Sample wt/vol: 4.0 (g/mL) G Lab File ID: 03JUN970143-I111

Level: (low/med) MED Date Received: 05/23/97

% Moisture: not dec. 5 Date Analyzed: 06/03/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10(ml) Soil Aliquot Volume: 40(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	160	U
108-88-3	Toluene	160	U
100-41-4	Ethylbenzene	160	U
----------	p/m-Xylene	330	U
95-47-6	o-Xylene	160	U

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

AB228

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331373

Sample wt/vol: 4.0 (g/mL) G Lab File ID: 03JUN970143-I081

Level: (low/med) MED Date Received: 05/23/97

% Moisture: not dec. 9 Date Analyzed: 06/03/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10(ml) Soil Aliquot Volume: 40(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	170	U
108-88-3	Toluene	170	U
100-41-4	Ethylbenzene	170	U
----------	p/m-Xylene	340	U
95-47-6	o-Xylene	170	U

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

AB238

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331374

Sample wt/vol: 4.0 (g/mL) G Lab File ID: 03JUN970143-I091

Level: (low/med) MED Date Received: 05/23/97

% Moisture: not dec. 21 Date Analyzed: 06/03/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10(ml) Soil Aliquot Volume: 40(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	200	U
108-88-3	Toluene	200	U
100-41-4	Ethylbenzene	580	
---	p/m-Xylene	2500	
95-47-6	o-Xylene	570	

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

AB333

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331370

Sample wt/vol: 4.0 (g/mL) G Lab File ID: 03JUN970143-I061

Level: (low/med) MED Date Received: 05/23/97

% Moisture: not dec. 15 Date Analyzed: 06/03/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10(ml) Soil Aliquot Volume: 40(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	180	U
108-88-3	Toluene	180	U
100-41-4	Ethylbenzene	2300	
	p/m-Xylene	8700	
95-47-6	o-Xylene	1900	

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

AB338

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331371

Sample wt/vol: 4.0 (g/mL) G Lab File ID: 03JUN970143-I071

Level: (low/med) MED Date Received: 05/23/97

% Moisture: not dec. 9 Date Analyzed: 06/03/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume: 10(ml) Soil Aliquot Volume: 40(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	170	U
108-88-3	Toluene	170	U
100-41-4	Ethylbenzene	170	U
----------	p/m-Xylene	340	U
95-47-6	o-Xylene	170	U

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B115

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331116

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 29MAY970737-I071

Level: (low/med) LOW Date Received: 05/21/97

% Moisture: not dec. 8 Date Analyzed: 05/29/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	0.54	U
108-88-3	Toluene	2.2	
100-41-4	Ethylbenzene	0.54	U
----------	p/m-Xylene	1.2	
95-47-6	o-Xylene	0.54	U

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B121

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331117

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 29MAY970737-I081

Level: (low/med) LOW Date Received: 05/21/97

% Moisture: not dec. 15 Date Analyzed: 05/29/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	0.59	U
108-88-3	Toluene	2.0	
100-41-4	Ethylbenzene	0.59	U
----------	p/m-Xylene	1.2	U
95-47-6	o-Xylene	0.59	U

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B229

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331112

Sample wt/vol: 1.0 (g/m_) G Lab File ID: 29MAY970737-I041

Level: (low/med) LOW Date Received: 05/21/97

% Moisture: not dec. 6 Date Analyzed: 05/29/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	2.6	U
108-88-3	Toluene	14	
100-41-4	Ethylbenzene	7.2	
----------	p/m-Xylene	22	
95-47-6	o-Xylene	13	

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B331

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331110

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 29MAY970737-I021

Level: (low/med) LOW Date Received: 05/21/97

% Moisture: not dec. 13 Date Analyzed: 05/29/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	0.57	U
108-88-3	Toluene	0.57	U
100-41-4	Ethylbenzene	0.57	U
----------	p/m-Xylene	1.1	U
95-47-6	o-Xylene	0.57	U

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B335

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331111

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 29MAY970737-I031

Level: (low/med) LOW Date Received: 05/21/97

% Moisture: not dec. 11 Date Analyzed: 05/29/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	0.56	U
108-88-3	Toluene	0.56	U
100-41-4	Ethylbenzene	0.56	U
----------	p/m-Xylene	1.1	U
95-47-6	o-Xylene	0.56	U

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B337

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331114

Sample wt/vol: 1.0 (g/mL) G Lab File ID: 29MAY970737-I051

Level: (low/med) LOW Date Received: 05/21/97

% Moisture: not dec. 7 Date Analyzed: 05/29/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	2.7	U
108-88-3	Toluene	11	
100-41-4	Ethylbenzene	2.7	U
----------	p/m-Xylene	5.7	
95-47-6	o-Xylene	2.8	

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B337D

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331115

Sample wt/vol: 5.0 (g/mL) G Lab File ID: 29MAY970737-I061

Level: (low/med) LOW Date Received: 05/21/97

% Moisture: not dec. 14 Date Analyzed: 05/29/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	0.58	U
108-88-3	Toluene	1.9	
100-41-4	Ethylbenzene	0.58	U
----------	p/m-Xylene	1.2	U
95-47-6	o-Xylene	0.58	U

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B229MS

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331112MS

Sample wt/vol: 1.0 (g/mL) G Lab File ID: 29MAY972251-I021

Level: (low/med) LOW Date Received: 05/21/97

% Moisture: not dec. 6 Date Analyzed: 05/30/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(ml) Soil Aliquot Volume: _____(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	110	
108-88-3	Toluene	110	
100-41-4	Ethylbenzene	110	
----------	p/m-Xylene	210	
95-47-6	o-Xylene	100	

FORM 1
8020-VOA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B229MSD

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331112MD

Sample wt/vol: 1.0 (g/mL) G Lab File ID: 29MAY972251-I031

Level: (low/med) LOW Date Received: 05/21/97

% Moisture: not dec. 6 Date Analyzed: 05/30/97

GC Column: DB-VRX ID: 0.45 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(ml) Soil Aliquot Volume: _____(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-43-2	Benzene	120	
108-88-3	Toluene	120	
100-41-4	Ethylbenzene	120	
----------	p/m-Xylene	230	
95-47-6	o-Xylene	110	

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 23.77 G
% Moisture: 21 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: AB238
Lab Sample ID: 331375
Date Received: 5/23/97
Date Analyzed: 6/3/97
Dilution Factor: 2.5
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	1600	U	121.417
71-43-2	Benzene	520	U	42.602
108-88-3	Toluene	1600	U	117.157
100-41-4	Ethylbenzene	520	U	42.602
1330-20-7	p/m-Xylene	2100	U	149.108
95-47-6	o-Xylene	1600		72.424
91-20-3	Naphthalene	33000	E	51.123

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	4400		2200	247.094	123.547
C9-C12 Aliphatics (FID)	290000		14500	140.588	7.029
C9-C10 Aromatics (PID)	130000		130000	85.205	85.205

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	140000	Y

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 52.73 G
% Moisture: 4 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: BAK
Lab Sample ID: 331120
Date Received: 5/21/97
Date Analyzed: 5/29/97
Dilution Factor: 1
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	230	U	18.016
71-43-2	Benzene	77	U	6.322
108-88-3	Toluene	230	U	17.384
100-41-4	Ethylbenzene	77	U	6.322
1330-20-7	p/m-Xylene	310	U	22.125
95-47-6	o-Xylene	150	U	10.747
91-20-3	Naphthalene	150	U	7.586

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	150	U	75	36.665	18.332
C9-C12 Aliphatics (FID)	480		24	20.861	1.043
C9-C10 Aromatics (PID)	150	U	150	12.643	12.643

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	24	Y

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 52.73 G
% Moisture: 4 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: BAKRE
Lab Sample ID: 331120R1
Date Received: 5/21/97
Date Analyzed: 5/29/97
Dilution Factor: 1
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	230	U	18.016
71-43-2	Benzene	77	U	6.322
108-88-3	Toluene	230	U	17.384
100-41-4	Ethylbenzene	77	U	6.322
1330-20-7	p/m-Xylene	310	U	22.125
95-47-6	o-Xylene	150	U	10.747
91-20-3	Naphthalene	150	U	7.586

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	150	U	75	36.665	18.332
C9-C12 Aliphatics (FID)	150	U	7.5	20.861	1.043
C9-C10 Aromatics (PID)	150	U	150	12.643	12.643

	Total Tox.	Q	
Volatile Petroleum Hydrocarbons (VPH) Concentration	007.5	UX	

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 30.87 G
% Moisture: 11 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: AB123
Lab Sample ID: 331377
Date Received: 5/23/97
Date Analyzed: 6/3/97
Dilution Factor: 2.5
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	1100	U	82.987
71-43-2	Benzene	350	U	29.118
108-88-3	Toluene	1100	U	80.075
100-41-4	Ethylbenzene	350	U	29.118
1330-20-7	p/m-Xylene	2,110 1400	U	101.913
95-47-6	o-Xylene	710	U	49.501
91-20-3	Naphthalene	39000	E	34.942

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	710	U	355	168.885	84.443
C9-C12 Aliphatics (FID)	2600000		130000	96.090	4.804
C9-C10 Aromatics (PID)	110000		110000	58.236	58.236

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	240000	Y

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 30.87 G
% Moisture: 11 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: AB123RE
Lab Sample ID: 331377R1
Date Received: 5/23/97
Date Analyzed: 6/15/97
Dilution Factor: 2.5
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	1100	U	82.987
71-43-2	Benzene	350	U	29.118
108-88-3	Toluene	1100	U	80.075
100-41-4	Ethylbenzene	350	U	29.118
1330-20-7	p/m-Xylene	1400	U	101.913
95-47-6	o-Xylene	710	U	49.501
91-20-3	Naphthalene	66000	E	34.942

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	790		395	168.885	84.443
C9-C12 Aliphatics (FID)	330000		16500	96.090	4.804
C9-C10 Aromatics (PID)	190000		190000	58.236	58.236

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	210000	Y

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 23.77 G
% Moisture: 21 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: AB238RE
Lab Sample ID: 331375R1
Date Received: 5/23/97
Date Analyzed: 6/15/97
Dilution Factor: 2.5
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	1600	U	121.417
71-43-2	Benzene	520	U	42.602
108-88-3	Toluene	1600	U	117.157
100-41-4	Ethylbenzene	520	U	42.602
1330-20-7	p/m-Xylene	2100	U	149.108
95-47-6	o-Xylene	3000		72.424
91-20-3	Naphthalene	140000	E	51.123

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	15000		7500	247.094	123.547
C9-C12 Aliphatics (FID)	1200000		60000	140.588	7.029
C9-C10 Aromatics (PID)	580000		580000	85.205	85.205

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	650000	Y

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 46.76 G
% Moisture: 9 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: AB338
Lab Sample ID: 331372
Date Received: 5/23/97
Date Analyzed: 6/3/97
Dilution Factor: 2.5
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	690	U	53.582
71-43-2	Benzene	230	U	18.801
108-88-3	Toluene	690	U	51.702
100-41-4	Ethylbenzene	230	U	18.801
1330-20-7	p/m-Xylene	920	U	65.802
95-47-6	o-Xylene	460	U	31.961
91-20-3	Naphthalene	17000	E	22.561

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	460	U	230	109.044	54.522
C9-C12 Aliphatics (FID)	130000		6500	62.042	3.102
C9-C10 Aromatics (PID)	55000		55000	37.601	37.601

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	62000	Y

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 46.76 G
% Moisture: 9 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: AB338RE
Lab Sample ID: 331372R1
Date Received: 5/23/97
Date Analyzed: 6/15/97
Dilution Factor: 2.5
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	690	U	53.582
71-43-2	Benzene	230	U	18.801
108-88-3	Toluene	690	U	51.702
100-41-4	Ethylbenzene	230	U	18.801
1330-20-7	p/m-Xylene	920	U	65.802
95-47-6	o-Xylene	460	U	31.961
91-20-3	Naphthalene	30000	E	22.561

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	970		485	109.044	54.522
C9-C12 Aliphatics (FID)	180000		9000	62.042	3.102
C9-C10 Aromatics (PID)	94000		94000	37.601	37.601

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	100000	Y

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 45.38 G
% Moisture: 15 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: B121
Lab Sample ID: 331118
Date Received: 5/21/97
Date Analyzed: 5/29/97
Dilution Factor: 1.0
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	300	U	23.643
71-43-2	Benzene	100	U	8.296
108-88-3	Toluene	300	U	22.814
100-41-4	Ethylbenzene	100	U	8.296
1330-20-7	p/m-Xylene	400	U	29.036
95-47-6	o-Xylene	200	U	14.103
91-20-3	Naphthalene	4000	E	9.955

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	190	U	95	48.117	24.058
C9-C12 Aliphatics (FID)	18000		900	27.377	1.369
C9-C10 Aromatics (PID)	11000		11000	16.592	16.592

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	12000	Y

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 45.38 G
% Moisture: 15 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: B121RE
Lab Sample ID: 331118R1
Date Received: 5/21/97
Date Analyzed: 5/29/97
Dilution Factor: 1
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	300	U	23.643
71-43-2	Benzene	100	U	8.296
108-88-3	Toluene	300	U	22.814
100-41-4	Ethylbenzene	100	U	8.296
1330-20-7	p/m-Xylene	400	U	29.036
95-47-6	o-Xylene	200	U	14.103
91-20-3	Naphthalene	3900	E	9.955

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	190	U	95	48.117	24.058
C9-C12 Aliphatics (FID)	18000		900	27.377	1.369
C9-C10 Aromatics (PID)	11000		11000	16.592	16.592

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	12000	Y

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 45.38 G
% Moisture: 6 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: B229
Lab Sample ID: 331113
Date Received: 5/21/97
Date Analyzed: 5/29/97
Dilution Factor: 2
Soil Aliquot Volume: 50

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	1100	U	85.519
71-43-2	Benzene	360	U	30.007
108-88-3	Toluene	1100	U	82.518
100-41-4	Ethylbenzene	360	U	30.007
1330-20-7	p/m-Xylene	1500	U	105.023
95-47-6	o-Xylene	730	U	51.011
91-20-3	Naphthalene	52000	E	36.008

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	790		395	174.039	87.019
C9-C12 Aliphatics (FID)	160000		8000	99.022	4.951
C9-C10 Aromatics (PID)	180000		180000	60.013	60.013

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	190000	Y

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 45.38 G
% Moisture: 6 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: B229RE
Lab Sample ID: 331113R1
Date Received: 5/21/97
Date Analyzed: 5/29/97
Dilution Factor: 2
Soil Aliquot Volume: 50

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	1100	U	85.519
71-43-2	Benzene	380	U	30.007
108-88-3	Toluene	1100	U	82.518
100-41-4	Ethylbenzene	380	U	30.007
1330-20-7	p/m-Xylene	1500	U	105.023
95-47-6	o-Xylene	760	U	51.011
91-20-3	Naphthalene	56000	E	36.008

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	770		385	174.039	87.019
C9-C12 Aliphatics (FID)	160000		8000	99.022	4.951
C9-C10 Aromatics (PID)	34000		34000	60.013	60.013

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	42000	Y

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 15.00 G
% Moisture: (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: TRIP-1
Lab Sample ID: 331379
Date Received: 5/23/97
Date Analyzed: 6/3/97
Dilution Factor: 2.5
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	2000	U	152.000
71-43-2	Benzene	650	U	53.333
108-88-3	Toluene	2000	U	146.667
100-41-4	Ethylbenzene	650	U	53.333
1330-20-7	p/m-Xylene	2600	U	186.667
95-47-6	o-Xylene	1300	U	90.667
91-20-3	Naphthalene	1300	U	64.000

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	1300	U	650	309.333	154.667
C9-C12 Aliphatics (FID)	1300	U	65	176.000	8.800
C9-C10 Aromatics (PID)	1300	U	1300	106.667	106.667

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	65	UX

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 15.00 G
% Moisture: (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: TRIP-1RE
Lab Sample ID: 331379R1
Date Received: 5/23/97
Date Analyzed: 6/15/97
Dilution Factor: 2.5
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	2000	U	152.000
71-43-2	Benzene	650	U	53.333
108-88-3	Toluene	2000	U	146.667
100-41-4	Ethylbenzene	650	U	53.333
1330-20-7	p/m-Xylene	2600	U	186.667
95-47-6	o-Xylene	1300	U	90.667
91-20-3	Naphthalene	1300	U	64.000

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	1300	U	650	309.333	154.667
C9-C12 Aliphatics (FID)	1300	U	65	176.000	8.800
C9-C10 Aromatics (PID)	1300	U	1300	106.667	106.667

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	65	UX

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 45.38 G
% Moisture: 6 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: B229MS
Lab Sample ID: 331113MS
Date Received: 5/21/97
Date Analyzed: 5/29/97
Dilution Factor: 2
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	5000		42.759
71-43-2	Benzene	1800		15.003
108-88-3	Toluene	4600		41.259
100-41-4	Ethylbenzene	1800		15.003
1330-20-7	p/m-Xylene	5800		52.512
95-47-6	o-Xylene	3000		25.506
91-20-3	Naphthalene	30000	E	18.004

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	13000		6500	87.019	43.510
C9-C12 Aliphatics (FID)	190000		9500	49.511	2.476
C9-C10 Aromatics (PID)	98000		98000	30.007	30.007

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	110000	Y

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	VOLATILE PETROLEUM HYDROCARBON (VPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 45.38 G
% Moisture: 6 (%)
Level: MED (low/med)
Extract Volume: 16 (ml)
GC Column: HP-5
Column ID: 0.53
Conc Units: UG/KG

Contract: 97000
Case: 97000
SDG: 65012
Client ID: B229MSD
Lab Sample ID: 331113MD
Date Received: 5/21/97
Date Analyzed: 5/29/97
Dilution Factor: 2
Soil Aliquot Volume: 100

CAS NO.	Analyte	Amount	Q	MDL
1634-04-4	Methyl tert-Butyl Ether	4600		42.759
71-43-2	Benzene	1800		15.003
108-88-3	Toluene	4500		41.259
100-41-4	Ethylbenzene	1800		15.003
1330-20-7	p/m-Xylene	5800		52.512
95-47-6	o-Xylene	3000		25.506
91-20-3	Naphthalene	29000	E	18.004

VPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C5-C8 Aliphatics (FID)**	14000		7000	87.019	43.510
C9-C12 Aliphatics (FID)	180000		9000	49.511	2.476
C9-C10 Aromatics (PID)	94000		94000	30.007	30.007

	Total Tox.	Q
Volatile Petroleum Hydrocarbons (VPH) Concentration	110000	Y

** Excludes BTEX and MTBE

UX = The reported calculated VPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated VPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

Form 1	EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

Lab Name:	ITS Environmental		Contract:	97000
Lab Code:	INCHVT		Case:	97000
Matrix:	SOIL	(soil/water)	SDG:	65012
Sample wt/vol:	10.00	G	Sample ID:	331112MS
% Moisture:	6	(%)	Sample ID:	B229MS
Extraction:	SONC		Date Received:	05/21/97
Extract Volume:	1	(ml)	Date Extracted:	05/23/97
Injection Volume:	1	(ul)	Date Analyzed:	06/04/97
Conc. Units:	MG/KG		Dilution Factor:	5

CAS NO.	Analyte	Amount	Q	MDL
91-20-3	Naphthalene	4.2		0.2926
91-57-6	2-Methylnaphthalene	17		0.2447
208-96-8	Acenaphthylene	3	P	0.1489
83-32-9	Acenaphthene	2.6	U	0.1489
86-73-7	Fluorene	4.4	P	0.1543
85-01-8	Phenanthrene	7.4		0.1702
120-12-7	Anthracene	2.6	U	0.2606
206-44-0	Fluoranthene	2.6	U	0.2766
129-00-0	Pyrene	2.6	U	0.1809
56-55-3	Benzo(a)anthracene	2.6	U	0.2766
218-01-9	Chrysene	2.6	U	0.2553
205-99-2	Benzo(b)fluoranthene	2.6	U	0.1862
207-08-9	Benzo(k)fluoranthene	2.6	U	0.1277
50-32-8	Benzo(a)pyrene	2.6	U	0.1755
193-39-5	Indeno(1,2,3-cd)pyrene	2.6	U	0.1436
53-70-3	Dibenzo(a,h)anthracene	2.6	U	0.4574
191-24-2	Benzo(ghi)perylene	2.6	U	0.2819

EPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C9-C18 Aliphatics	300		15	0.3351	0.1676
C19-C36 Aliphatics	54	P	0.3	0.7979	0.0399
C10-C22 Aromatics	500		500	0.4574	0.4574
Extractable Petroleum Hydrocarbons (EPH) Concentration			520	Y	

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

UX = The reported calculated EPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated EPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Form 1	EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 10.00 G
% Moisture: 4 (%)
Extraction: SONC
Extract Volume: 1 (ml)
Injection Volume: 1 (ul)
Conc. Units: MG/KG

Contract: 97000
Case: 97000
SDG: 65012
Sample ID: 331119
Sample ID: BAK
Date Received: 05/21/97
Date Extracted: 05/23/97
Date Analyzed: 05/31/97
Dilution Factor: 1

CAS NO.	Analyte	Amount	Q	MDL
91-20-3	Naphthalene	0.52	U	0.0573
91-57-6	2-Methylnaphthalene	0.52	U	0.0479
208-96-8	Acenaphthylene	0.52	U	0.0292
83-32-9	Acenaphthene	0.52	U	0.0292
86-73-7	Fluorene	0.52	U	0.0302
85-01-8	Phenanthrene	0.52	U	0.0333
120-12-7	Anthracene	0.52	U	0.0510
206-44-0	Fluoranthene	0.52	U	0.0542
129-00-0	Pyrene	0.52	U	0.0354
56-55-3	Benzo(a)anthracene	0.52	U	0.0542
218-01-9	Chrysene	0.52	U	0.0500
205-99-2	Benzo(b)fluoranthene	0.52	U	0.0365
207-08-9	Benzo(k)fluoranthene	0.52	U	0.0250
50-32-8	Benzo(a)pyrene	0.52	U	0.0344
193-39-5	Indeno(1,2,3-cd)pyrene	0.52	U	0.0281
53-70-3	Dibenzo(a,h)anthracene	0.52	U	0.0896
191-24-2	Benzo(ghi)perylene	0.52	U	0.0552

EPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C9-C18 Aliphatics	.0031	U	0.16	0.0656	0.0328
C19-C36 Aliphatics	4.2	U	0.02	0.1563	0.0078
C10-C22 Aromatics	8.8	U	8.8	0.0896	0.0896
Extractable Petroleum Hydrocarbons (EPH) Concentration			0.02	UX	

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

UX = The reported calculated EPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated EPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Form 1	EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 10.00 G
% Moisture: 11 (%)
Extraction: SONC
Extract Volume: 1 (ml)
Injection Volume: 1 (ul)
Conc. Units: MG/KG

Contract: 97000
Case: 97000
SDG: 65012
Sample ID: 331376
Sample ID: AB123
Date Received: 05/23/97
Date Extracted: 06/02/97
Date Analyzed: 06/04/97
Dilution Factor: 5

CAS NO.	Analyte	Amount	Q	MDL
91-20-3	Naphthalene	2.8	U	0.3090
91-57-6	2-Methylnaphthalene	16		0.2584
208-96-8	Acenaphthylene	4.5	P	0.1573
83-32-9	Acenaphthene	3.6	P	0.1573
86-73-7	Fluorene	4.3		0.1629
85-01-8	Phenanthrene	6.2		0.1798
120-12-7	Anthracene	2.8	U	0.2753
206-44-0	Fluoranthene	2.8	U	0.2921
129-00-0	Pyrene	2.8	U	0.1910
56-55-3	Benzo(a)anthracene	2.8	U	0.2921
218-01-9	Chrysene	2.8	U	0.2697
205-99-2	Benzo(b)fluoranthene	2.8	U	0.1966
207-08-9	Benzo(k)fluoranthene	2.8	U	0.1348
50-32-8	Benzo(a)pyrene	2.8	U	0.1854
193-39-5	Indeno(1,2,3-cd)pyrene	2.8	U	0.1517
53-70-3	Dibenzo(a,h)anthracene	2.8	U	0.4831
191-24-2	Benzo(ghi)perylene	2.8	U	0.2978

EPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C9-C18 Aliphatics	2000		100	0.3539	0.1770
C19-C36 Aliphatics	110	P	0.55	0.8427	0.0421
C10-C22 Aromatics	380		380	0.4831	0.4831
Extractable Petroleum Hydrocarbons (EPH) Concentration			480	Y	

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

UX = The reported calculated EPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated EPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Form 1	EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 10.00 G
% Moisture: 21 (%)
Extraction: SONC
Extract Volume: 1 (ml)
Injection Volume: 1 (ul)
Conc. Units: MG/KG

Contract: 97000
Case: 97000
SDG: 65012
Sample ID: 331374
Sample ID: AB238
Date Received: 05/21/97
Date Extracted: 05/23/97
Date Analyzed: 06/05/97
Dilution Factor: 20

CAS NO.	Analyte	Amount	Q	MDL
91-20-3	Naphthalene	32		1.3924
91-57-6	2-Methylnaphthalene	180		1.1646
208-96-8	Acenaphthylene	40		0.7089
83-32-9	Acenaphthene	45	P	0.7089
86-73-7	Fluorene	28	P	0.7342
85-01-8	Phenanthrene	36		0.8101
120-12-7	Anthracene	13	U	1.2405
206-44-0	Fluoranthene	13	U	1.3165
129-00-0	Pyrene	13	U	0.8608
56-55-3	Benzo(a)anthracene	13	U	1.3165
218-01-9	Chrysene	13	U	1.2152
205-99-2	Benzo(b)fluoranthene	13	U	0.8861
207-08-9	Benzo(k)fluoranthene	13	U	0.6076
50-32-8	Benzo(a)pyrene	13	U	0.8354
193-39-5	Indeno(1,2,3-cd)pyrene	13	U	0.6835
53-70-3	Dibenzo(a,h)anthracene	13	U	2.1772
191-24-2	Benzo(ghi)perylene	13	U	1.3418

EPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C9-C18 Aliphatics	3800		190	1.5949	0.7975
C19-C36 Aliphatics	210	P	21.1	3.7975	0.1899
C10-C22 Aromatics	3400		3400	2.1772	2.1772
Extractable Petroleum Hydrocarbons (EPH) Concentration			3600	Y	

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

UX = The reported calculated EPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated EPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Form 1	EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 10.00 G
% Moisture: 9 (%)
Extraction: SONC
Extract Volume: 1 (ml)
Injection Volume: 1 (ul)
Conc. Units: MG/KG

Contract: 97000
Case: 97000
SDG: 65012
Sample ID: 331371
Sample ID: AB338
Date Received: 05/23/97
Date Extracted: 06/02/97
Date Analyzed: 06/04/97
Dilution Factor: 5

CAS NO.	Analyte	Amount	Q	MDL
91-20-3	Naphthalene	3.9	P	0.3022
91-57-6	2-Methylnaphthalene	31		0.2527
208-96-8	Acenaphthylene	8.8	P	0.1538
83-32-9	Acenaphthene	7.8	P	0.1538
86-73-7	Fluorene	3.7		0.1593
85-01-8	Phenanthrene	7.2		0.1758
120-12-7	Anthracene	2.7	U	0.2692
206-44-0	Fluoranthene	2.7	U	0.2857
129-00-0	Pyrene	2.7	U	0.1868
56-55-3	Benzo(a)anthracene	2.7	U	0.2857
218-01-9	Chrysene	2.7	U	0.2637
205-99-2	Benzo(b)fluoranthene	2.7	U	0.1923
207-08-9	Benzo(k)fluoranthene	2.7	U	0.1319
50-32-8	Benzo(a)pyrene	2.7	U	0.1813
193-39-5	Indeno(1,2,3-cd)pyrene	2.7	U	0.1484
53-70-3	Dibenzo(a,h)anthracene	2.7	U	0.4725
191-24-2	Benzo(ghi)perylene	2.7	U	0.2912

EPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C9-C18 Aliphatics	710		36	0.3462	0.1731
C19-C36 Aliphatics	43	P	0.2	0.8242	0.0412
C10-C22 Aromatics	800		800	0.4725	0.4725
Extractable Petroleum Hydrocarbons (EPH) Concentration			840	Y	

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

UX = The reported calculated EPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated EPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Form 1	EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 10.00 G
% Moisture: 15 (%)
Extraction: SONC
Extract Volume: 1 (ml)
Injection Volume: 1 (ul)
Conc. Units: MG/KG

Contract: 97000
Case: 97000
SDG: 65012
Sample ID: 331117
Sample ID: B121
Date Received: 05/21/97
Date Extracted: 05/23/97
Date Analyzed: 05/31/97
Dilution Factor: 1

CAS NO.	Analyte	Amount	Q	MDL
91-20-3	Naphthalene	0.59	U	0.0647
91-57-6	2-Methylnaphthalene	0.59	U	0.0541
208-96-8	Acenaphthylene	0.59	U	0.0329
83-32-9	Acenaphthene	0.59	U	0.0329
86-73-7	Fluorene	0.59	U	0.0341
85-01-8	Phenanthrene	0.59	U	0.0376
120-12-7	Anthracene	0.59	U	0.0576
206-44-0	Fluoranthene	0.59	U	0.0612
129-00-0	Pyrene	0.59	U	0.0400
56-55-3	Benzo(a)anthracene	0.59	U	0.0612
218-01-9	Chrysene	0.59	U	0.0565
205-99-2	Benzo(b)fluoranthene	0.59	U	0.0412
207-08-9	Benzo(k)fluoranthene	0.59	U	0.0282
50-32-8	Benzo(a)pyrene	0.59	U	0.0388
193-39-5	Indeno(1,2,3-cd)pyrene	0.59	U	0.0318
53-70-3	Dibenzo(a,h)anthracene	0.59	U	0.1012
191-24-2	Benzo(ghi)perylene	0.59	U	0.0624

EPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C9-C18 Aliphatics	47		2.4	0.0741	0.0371
C19-C36 Aliphatics	4.7	U	0.02	0.1765	0.0088
C10-C22 Aromatics	110		110	0.1012	0.1012
Extractable Petroleum Hydrocarbons (EPH) Concentration			110	Y	

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

UX = The reported calculated EPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated EPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Form 1	EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 10.00 G
% Moisture: 6 (%)
Extraction: SONC
Extract Volume: 1 (ml)
Injection Volume: 1 (ul)
Conc. Units: MG/KG

Contract: 97000
Case: 97000
SDG: 65012
Sample ID: 331112
Sample ID: B229
Date Received: 05/21/97
Date Extracted: 05/23/97
Date Analyzed: 06/04/97
Dilution Factor: 5

CAS NO.	Analyte	Amount	Q	MDL
91-20-3	Naphthalene	2.6	U	0.2926
91-57-6	2-Methylnaphthalene	17		0.2447
208-96-8	Acenaphthylene	5.8	P	0.1489
83-32-9	Acenaphthene	3.2	P	0.1489
86-73-7	Fluorene	2.6	U	0.1543
85-01-8	Phenanthrene	4.6		0.1702
120-12-7	Anthracene	2.6	U	0.2606
206-44-0	Fluoranthene	2.6	U	0.2766
129-00-0	Pyrene	2.6	U	0.1809
56-55-3	Benzo(a)anthracene	2.6	U	0.2766
218-01-9	Chrysene	2.6	U	0.2553
205-99-2	Benzo(b)fluoranthene	2.6	U	0.1862
207-08-9	Benzo(k)fluoranthene	2.6	U	0.1277
50-32-8	Benzo(a)pyrene	2.6	U	0.1755
193-39-5	Indeno(1,2,3-cd)pyrene	2.6	U	0.1436
53-70-3	Dibenzo(a,h)anthracene	2.6	U	0.4574
191-24-2	Benzo(ghi)perylene	2.6	U	0.2819

EPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C9-C18 Aliphatics	290		14	0.3351	0.1676
C19-C36 Aliphatics	34	P	0.2	0.7979	0.0399
C10-C22 Aromatics	240	P	240	0.4574	0.4574
Extractable Petroleum Hydrocarbons (EPH) Concentration			250	Y	

Note: No values are reported between the method detection limit (MDL) and the reporting limit.

UX = The reported calculated EPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated EPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

Form 1	EXTRACTABLE PETROLEUM HYDROCARBON (EPH) ANALYSIS

Lab Name: ITS Environmental
Lab Code: INCHVT
Matrix: SOIL (soil/water)
Sample wt/vol: 10.00 G
% Moisture: 6 (%)
Extraction: SONC
Extract Volume: 1 (ml)
Injection Volume: 1 (ul)
Conc. Units: MG/KG

Contract: 97000
Case: 97000
SDG: 65012
Sample ID: 331112MD
Sample ID: B229MSD
Date Received: 05/21/97
Date Extracted: 05/23/97
Date Analyzed: 06/04/97
Dilution Factor: 5

CAS NO.	Analyte	Amount	Q	MDL
91-20-3	Naphthalene	3.3		0.2926
91-57-6	2-Methylnaphthalene	15		0.2447
208-96-8	Acenaphthylene	2.6	U	0.1489
83-32-9	Acenaphthene	6	P	0.1489
86-73-7	Fluorene	3.9	P	0.1543
85-01-8	Phenanthrene	6.8		0.1702
120-12-7	Anthracene	2.6	U	0.2606
206-44-0	Fluoranthene	2.6	U	0.2766
129-00-0	Pyrene	2.6	U	0.1809
56-55-3	Benzo(a)anthracene	2.6	U	0.2766
218-01-9	Chrysene	2.6	U	0.2553
205-99-2	Benzo(b)fluoranthene	2.6	U	0.1862
207-08-9	Benzo(k)fluoranthene	2.6	U	0.1277
50-32-8	Benzo(a)pyrene	2.6	U	0.1755
193-39-5	Indeno(1,2,3-cd)pyrene	2.6	U	0.1436
53-70-3	Dibenzo(a,h)anthracene	2.6	U	0.4574
191-24-2	Benzo(ghi)perylene	2.6	U	0.2819

EPH Totals	Amount	Q	Toxicity Conc.	MDL	Toxicity MDL
C9-C18 Aliphatics	260		13	0.3351	0.1676
C19-C36 Aliphatics	40	P	0.2	0.7979	0.0399
C10-C22 Aromatics	420		420	0.4574	0.4574
Extractable Petroleum Hydrocarbons (EPH) Concentration			430	Y	

·Note: No values are reported between the method detection limit (MDL) and the reporting limit.

UX = The reported calculated EPH concentration is the lowest non-detected toxicologically-weighted value for the hydrocarbon ranges of interest.

Y = The reported calculated EPH concentration is the sum of the detected toxicologically-weighted value(s) for the hydrocarbon ranges of interest.

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

AB123

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331376

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 11 decanted: (Y/N) N Date Received: 05/23/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 06/02/97

Concentrated Extract Volume: 10 (mL) Date Analyzed: 06/05/97

Injection Volume: 25.0 (uL) Dilution Factor: 8.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	6900	
208-96-8	Acenaphthylene	3400	
83-32-9	Acenaphthene	1800	JP
86-73-7	Fluorene	3300	
85-01-8	Phenanthrene	12000	P
120-12-7	Anthracene	2000	P
206-44-0	Fluoranthene	1400	P
129-00-0	Pyrene	400	P
56-55-3	Benzo(a)anthracene	420	P
218-01-9	Chrysene	280	P
205-99-2	Benzo(b)fluoranthene	31	U
207-08-9	Benzo(k)fluoranthene	31	U
50-32-8	Benzo(a)pyrene	30	U
53-70-3	Dibenz(ah)anthracene	76	U
191-24-2	Benzo(ghi)perylene	76	U
193-39-5	Indeno(123-cd)pyrene	76	U

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

AB133

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331378

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 5 decanted: (Y/N) N Date Received: 05/23/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted:06/02/97

Concentrated Extract Volume: 10(mL) Date Analyzed: 06/05/97

Injection Volume: 25.0(uL) Dilution Factor: 8.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	5500	
208-96-8	Acenaphthylene	3100	
83-32-9	Acenaphthene	2100	U
86-73-7	Fluorene	2500	
85-01-8	Phenanthrene	9600	P
120-12-7	Anthracene	1500	P
206-44-0	Fluoranthene	1000	P
129-00-0	Pyrene	430	P
56-55-3	Benzo(a)anthracene	320	P
218-01-9	Chrysene	210	P
205-99-2	Benzo(b)fluoranthene	29	U
207-08-9	Benzo(k)fluoranthene	29	U
50-32-8	Benzo(a)pyrene	29	U
53-70-3	Dibenz(ah)anthracene	71	U
191-24-2	Benzo(ghi)perylene	71	U
193-39-5	Indeno(123-cd)pyrene	71	U

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

AB228

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331373

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 9 decanted: (Y/N) N Date Received: 05/23/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 06/02/97

Concentrated Extract Volume: 10(mL) Date Analyzed: 06/05/97

Injection Volume: 25.0(uL) Dilution Factor: 30.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	29000	
208-96-8	Acenaphthylene	14000	
83-32-9	Acenaphthene	8200	U
86-73-7	Fluorene	8900	
85-01-8	Phenanthrene	38000	P
120-12-7	Anthracene	4700	P
206-44-0	Fluoranthene	3900	P
129-00-0	Pyrene	1300	P
56-55-3	Benzo(a)anthracene	1200	P
218-01-9	Chrysene	810	P
205-99-2	Benzo(b)fluoranthene	120	U
207-08-9	Benzo(k)fluoranthene	120	U
50-32-8	Benzo(a)pyrene	110	U
53-70-3	Dibenz(ah)anthracene	280	U
191-24-2	Benzo(ghi)perylene	280	U
193-39-5	Indeno(123-cd)pyrene	280	U

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

AB238

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331374

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 21 decanted: (Y/N) N Date Received: 05/23/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 06/02/97

Concentrated Extract Volume: 10(mL) Date Analyzed: 06/05/97

Injection Volume: 25.0(uL) Dilution Factor: 20.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	24000	
208-96-8	Acenaphthylene	12000	
83-32-9	Acenaphthene	6300	U
86-73-7	Fluorene	7100	
85-01-8	Phenanthrene	33000	P
120-12-7	Anthracene	3800	P
206-44-0	Fluoranthene	3700	P
129-00-0	Pyrene	1400	P
56-55-3	Benzo(a)anthracene	1100	P
218-01-9	Chrysene	710	P
205-99-2	Benzo(b)fluoranthene	89	U
207-08-9	Benzo(k)fluoranthene	89	U
50-32-8	Benzo(a)pyrene	86	U
53-70-3	Dibenz(ah)anthracene	210	U
191-24-2	Benzo(ghi)perylene	210	U
193-39-5	Indeno(123-cd)pyrene	210	U

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

AB333

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331370

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 15 decanted: (Y/N) N Date Received: 05/23/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 06/02/97

Concentrated Extract Volume: 10 (mL) Date Analyzed: 06/12/97

Injection Volume: 25.0 (uL) Dilution Factor: 25.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	25000	
208-96-8	Acenaphthylene	12000	
83-32-9	Acenaphthene	7400	U
86-73-7	Fluorene	8100	
85-01-8	Phenanthrene	32000	P
120-12-7	Anthracene	11000	
206-44-0	Fluoranthene	3800	P
129-00-0	Pyrene	2000	P
56-55-3	Benzo(a)anthracene	1100	P
218-01-9	Chrysene	640	P
205-99-2	Benzo(b)fluoranthene	100	U
207-08-9	Benzo(k)fluoranthene	100	U
50-32-8	Benzo(a)pyrene	100	U
53-70-3	Dibenz(ah)anthracene	250	U
191-24-2	Benzo(ghi)perylene	250	U
193-39-5	Indeno(123-cd)pyrene	250	U

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

AB338

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331371

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 9 decanted: (Y/N) N Date Received: 05/23/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 06/02/97

Concentrated Extract Volume: 10(mL) Date Analyzed: 06/05/97

Injection Volume: 25.0(uL) Dilution Factor: 4.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	3700	
208-96-8	Acenaphthylene	1900	
83-32-9	Acenaphthene	820	JP
86-73-7	Fluorene	1300	
85-01-8	Phenanthrene	5300	P
120-12-7	Anthracene	750	P
206-44-0	Fluoranthene	540	P
129-00-0	Pyrene	170	P
56-55-3	Benzo(a)anthracene	180	P
218-01-9	Chrysene	110	P
205-99-2	Benzo(b)fluoranthene	15	U
207-08-9	Benzo(k)fluoranthene	15	U
50-32-8	Benzo(a)pyrene	15	U
53-70-3	Dibenz(ah)anthracene	37	U
191-24-2	Benzo(ghi)perylene	37	U
193-39-5	Indeno(123-cd)pyrene	37	U

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B115

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331116

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 8 decanted: (Y/N) N Date Received: 05/21/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 05/23/97

Concentrated Extract Volume: 10(mL) Date Analyzed: 06/04/97

Injection Volume: 25.0(uL) Dilution Factor: 2.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	540	U
208-96-8	Acenaphthylene	540	U
83-32-9	Acenaphthene	540	U
86-73-7	Fluorene	390	
85-01-8	Phenanthrene	2400	P
120-12-7	Anthracene	240	P
206-44-0	Fluoranthene	390	P
129-00-0	Pyrene	150	P
56-55-3	Benzo(a)anthracene	130	P
218-01-9	Chrysene	100	P
205-99-2	Benzo(b)fluoranthene	10	P
207-08-9	Benzo(k)fluoranthene	7.6	U
50-32-8	Benzo(a)pyrene	7.4	U
53-70-3	Dibenz(ah)anthracene	18	U
191-24-2	Benzo(ghi)perylene	18	U
193-39-5	Indeno(123-cd)pyrene	18	U

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B121

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331117

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 15 decanted: (Y/N) N Date Received: 05/21/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 05/23/97

Concentrated Extract Volume: 10 (mL) Date Analyzed: 06/04/97

Injection Volume: 25.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	290	U
208-96-8	Acenaphthylene	290	U
83-32-9	Acenaphthene	290	U
86-73-7	Fluorene	84	
85-01-8	Phenanthrene	470	P
120-12-7	Anthracene	99	U
206-44-0	Fluoranthene	48	P
129-00-0	Pyrene	59	P
56-55-3	Benzo(a)anthracene	29	P
218-01-9	Chrysene	30	P
205-99-2	Benzo(b)fluoranthene	6.3	P
207-08-9	Benzo(k)fluoranthene	4.1	U
50-32-8	Benzo(a)pyrene	4.0	U
53-70-3	Dibenz(ah)anthracene	9.9	U
191-24-2	Benzo(ghi)perylene	17	
193-39-5	Indeno(123-cd)pyrene	9.9	U

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B229

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331112

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 6 decanted: (Y/N) N Date Received: 05/21/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 05/23/97

Concentrated Extract Volume: 10 (mL) Date Analyzed: 06/05/97

Injection Volume: 25.0 (uL) Dilution Factor: 4.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	640	P
208-96-8	Acenaphthylene	370	
83-32-9	Acenaphthene	1100	U
86-73-7	Fluorene	300	
85-01-8	Phenanthrene	1200	P
120-12-7	Anthracene	160	P
206-44-0	Fluoranthene	530	P
129-00-0	Pyrene	160	P
56-55-3	Benzo(a)anthracene	150	P
218-01-9	Chrysene	86	
205-99-2	Benzo(b)fluoranthene	15	U
207-08-9	Benzo(k)fluoranthene	15	U
50-32-8	Benzo(a)pyrene	14	U
53-70-3	Dibenz(ah)anthracene	36	U
191-24-2	Benzo(ghi)perylene	36	U
193-39-5	Indeno(123-cd)pyrene	36	U

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B237

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331114

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 7 decanted: (Y/N) N Date Received: 05/21/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted:05/23/97

Concentrated Extract Volume: 10(mL) Date Analyzed: 06/04/97

Injection Volume: 25.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	270	U
208-96-8	Acenaphthylene	270	U
83-32-9	Acenaphthene	270	U
86-73-7	Fluorene	36	U
85-01-8	Phenanthrene	67	
120-12-7	Anthracene	90	U
206-44-0	Fluoranthene	9.0	U
129-00-0	Pyrene	9.0	U
56-55-3	Benzo(a)anthracene	3.8	U
218-01-9	Chrysene	3.6	U
205-99-2	Benzo(b)fluoranthene	3.8	U
207-08-9	Benzo(k)fluoranthene	3.8	U
50-32-8	Benzo(a)pyrene	3.6	U
53-70-3	Dibenz(ah)anthracene	9.0	U
191-24-2	Benzo(ghi)perylene	9.0	U
193-39-5	Indeno(123-cd)pyrene	9.0	U

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B237D

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331115

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 14 decanted: (Y/N) N Date Received: 05/21/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 05/23/97

Concentrated Extract Volume: 10(mL) Date Analyzed: 06/04/97

Injection Volume: 25.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	290	U
208-96-8	Acenaphthylene	290	U
83-32-9	Acenaphthene	290	U
86-73-7	Fluorene	40	U
85-01-8	Phenanthrene	40	U
120-12-7	Anthracene	98	U
206-44-0	Fluoranthene	9.8	U
129-00-0	Pyrene	9.8	U
56-55-3	Benzo(a)anthracene	4.1	U
218-01-9	Chrysene	4.0	U
205-99-2	Benzo(b)fluoranthene	4.1	U
207-08-9	Benzo(k)fluoranthene	4.1	U
50-32-8	Benzo(a)pyrene	4.0	U
53-70-3	Dibenz(ah)anthracene	9.8	U
191-24-2	Benzo(ghi)perylene	9.8	U
193-39-5	Indeno(123-cd)pyrene	9.8	U

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B331

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331110

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 13 decanted: (Y/N) N Date Received: 05/21/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 05/23/97

Concentrated Extract Volume: 10(mL) Date Analyzed: 06/04/97

Injection Volume: 25.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	290	U
208-96-8	Acenaphthylene	290	U
83-32-9	Acenaphthene	290	U
86-73-7	Fluorene	39	U
85-01-8	Phenanthrene	39	U
120-12-7	Anthracene	96	U
206-44-0	Fluoranthene	9.6	U
129-00-0	Pyrene	9.6	U
56-55-3	Benzo(a)anthracene	4.0	U
218-01-9	Chrysene	3.9	U
205-99-2	Benzo(b)fluoranthene	4.0	U
207-08-9	Benzo(k)fluoranthene	4.0	U
50-32-8	Benzo(a)pyrene	3.9	U
53-70-3	Dibenz(ah)anthracene	9.6	U
191-24-2	Benzo(ghi)perylene	9.6	U
193-39-5	Indeno(123-cd)pyrene	9.6	U

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B335

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331111

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 11 decanted: (Y/N) N Date Received: 05/21/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 05/23/97

Concentrated Extract Volume: 10(mL) Date Analyzed: 06/04/97

Injection Volume: 25.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	280	U
208-96-8	Acenaphthylene	280	U
83-32-9	Acenaphthene	280	U
86-73-7	Fluorene	38	U
85-01-8	Phenanthrene	38	U
120-12-7	Anthracene	94	U
206-44-0	Fluoranthene	9.4	U
129-00-0	Pyrene	9.4	U
56-55-3	Benzo(a)anthracene	3.9	U
218-01-9	Chrysene	3.8	U
205-99-2	Benzo(b)fluoranthene	3.9	U
207-08-9	Benzo(k)fluoranthene	3.9	U
50-32-8	Benzo(a)pyrene	3.8	U
53-70-3	Dibenz(ah)anthracene	9.4	U
191-24-2	Benzo(ghi)perylene	9.4	U
193-39-5	Indeno(123-cd)pyrene	9.4	U

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B229MS

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331112MS

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 6 decanted: (Y/N) N Date Received: 05/21/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 05/23/97

Concentrated Extract Volume: 10 (mL) Date Analyzed: 06/05/97

Injection Volume: 25.0 (uL) Dilution Factor: 4.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	2800	
208-96-8	Acenaphthylene	2000	
83-32-9	Acenaphthene	1100	P
86-73-7	Fluorene	1600	
85-01-8	Phenanthrene	5100	
120-12-7	Anthracene	1200	
206-44-0	Fluoranthene	540	P
129-00-0	Pyrene	220	P
56-55-3	Benzo(a)anthracene	210	P
218-01-9	Chrysene	150	P
205-99-2	Benzo(b)fluoranthene	72	
207-08-9	Benzo(k)fluoranthene	33	
50-32-8	Benzo(a)pyrene	70	
53-70-3	Dibenz(ah)anthracene	76	
191-24-2	Benzo(ghi)perylene	76	
193-39-5	Indeno(123-cd)pyrene	72	

FORM 1
PNA ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

B229MSD

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix: (soil/water) SOIL Lab Sample ID: 331112MD

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 6 decanted: (Y/N) N Date Received: 05/21/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 05/23/97

Concentrated Extract Volume: 10 (mL) Date Analyzed: 06/05/97

Injection Volume: 25.0 (uL) Dilution Factor: 4.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
91-20-3	Naphthalene	2700	
208-96-8	Acenaphthylene	1600	
83-32-9	Acenaphthene	1100	P
86-73-7	Fluorene	1600	
85-01-8	Phenanthrene	5000	P
120-12-7	Anthracene	1200	
206-44-0	Fluoranthene	540	P
129-00-0	Pyrene	200	P
56-55-3	Benzo(a)anthracene	180	P
218-01-9	Chrysene	140	P
205-99-2	Benzo(b)fluoranthene	74	
207-08-9	Benzo(k)fluoranthene	35	
50-32-8	Benzo(a)pyrene	72	
53-70-3	Dibenz(ah)anthracene	80	
191-24-2	Benzo(ghi)perylene	77	
193-39-5	Indeno(123-cd)pyrene	74	

FORM 3
SOIL PNA MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix Spike - Sample No.: B229

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC. LIMITS REC.
Naphthalene	710	640	2800	304*	30-150
Acenaphthylene	710	370	2000	230*	30-150
Acenaphthene	710	0.00	1100	155*	30-150
Fluorene	710	300	1600	183*	30-150
Phenanthrene	710	1200	5100	549*	30-150
Anthracene	710	160	1200	146	30-150
Fluoranthene	71	530	540	14*	30-150
Pyrene	71	160	220	84	30-150
Benzo(a)anthracene	71	150	210	84	30-150
Chrysene	71	86	150	90	30-150
Benzo(b)fluoranthene	71	0.00	72	101	30-150
Benzo(k)fluoranthene	35	0.00	33	94	30-150
Benzo(a)pyrene	71	0.00	70	98	30-150
Dibenz(ah)anthracene	71	0.00	76	107	30-150
Benzo(ghi)perylene	71	0.00	76	107	30-150
Indeno(123-cd)pyrene	71	0.00	72	101	30-150

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

COMMENTS: _____

FORM 3
SOIL PNA MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ITS ENVIRONMENTAL Contract: 97000

Lab Code: INCHVT Case No.: 97000 SAS No.: SDG No.: 65012

Matrix Spike - Sample No.: B229

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Naphthalene	710	2700	290*	5	30	30-150
Acenaphthylene	710	1600	173*	28	30	30-150
Acenaphthene	710	1100	155*	0	30	30-150
Fluorene	710	1600	183*	0	30	30-150
Phenanthrene	710	5000	535*	2	30	30-150
Anthracene	710	1200	146	0	30	30-150
Fluoranthene	71	540	14*	0	30	30-150
Pyrene	71	200	56	40*	30	30-150
Benzo(a)anthracene	71	180	42	67*	30	30-150
Chrysene	71	140	76	17	30	30-150
Benzo(b)fluoranthene	71	74	104	3	30	30-150
Benzo(k)fluoranthene	35	35	100	6	30	30-150
Benzo(a)pyrene	71	72	101	3	30	30-150
Dibenz(ah)anthracene	71	80	113	5	30	30-150
Benzo(ghi)perylene	71	77	108	1	30	30-150
Indeno(123-cd)pyrene	71	74	104	3	30	30-150

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 2 out of 16 outside limits
Spike Recovery: 12 out of 32 outside limits

COMMENTS: _____

Interpark Testing Services
Environmental Laboratories 55 South Park Drive Colchester, VT 05446 (802) 655-1203

CHAIN OF CUSTODY RECORD

Report to:	Invoice to
Company: PARSONS Eng. Sci.	Company:
Address: 290 ELWOOD DAVIS RD LIVERPOOL NY 13088	Address: SAME
Contact: JOHN MASTRACCHIO	Contact:
Phone: 315 451-9560	Phone:
Fax: 315 451-9570	PO/SO #: 726876.37
Contract/ Quote #:	

Sampler's Name: JOHN MASTRACCHIO
Sampler's Signature: John Mastracchio

Proj. No.: 726876.37
Project Name: WESTOVER MTF

ANALYSIS REQUESTED: TPH; BTEX; PAH; VPH/EPH; 418.1; 2080A; 8310

Lab use only
Due Date:

Temp. of coolers when received (C°): 1 2 3 4 5

Custody Seal N / Y
Intact N / Y

Screened For Radioactivity ☐

8000906

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	No./Type of Containers[2]: VOA	A/G 1 Lt.	250 ml	P/O	Lab Sample ID (Lab Use Only)
S	5/21	1400		X	WEMTF-AB3-33			X		
S	5/21	1445		X	WEMTF-AB3-38	X		X		
S	5/22	1035		X	WEMTF-AB2-28			X		
S	5/22	1145		X	WEMTF-AB2-38	X		X		
S	5/22	1410		X	WEMTF-AB1-23	X		X		
S	5/22	1500		X	WEMTF-AB1-33			X		
S	5/22				TRIP-1	X				

Turn around time ☒ Priority 1 or Standard ☐ Priority 2 or 50% * ☐ Priority 3 or 100% * ☐ Priority 4 ERS (Dallas Only) * Must Coordinate with Project Manager

Shipment For Case Complete ☐ Yes ☐ No

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
John Mastracchio	5/22/97	1800	FEDEX		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
			Sharon Munn	5/23/97	0930

Remarks: AIRBILL # 423494595 6

Client's delivery of samples constitutes acceptance of ITS Environmental Laboratories terms and conditions contained in the Price Schedule.

[1] Matrix WW - Wastewater W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other _____

ITS cannot accept verbal changes. Please Fax written changes to (802) 655-1248

[redacted] IT[redacted]viron[redacted]tal L[redacted]ator[redacted]89 E[redacted]ollin[redacted]d., #[redacted]icha[redacted], TX[redacted]1 (9[redacted]38-55[redacted] [redacted] [redacted] [redacted] CHA[redacted] OF C[redacted]USTOD[redacted]RECORD[redacted]

Report to:	Invoice to
Company: PARSONS ENGSCI	Company:
Address: 290 ELWOOD DAVIS RD LIVERPOOL, NY 13088	Address: SAME
Contact: JOHN MASTRACCHIO	Contact:
Phone: 315 451 9560	Phone:
Fax: 315 451-9570	PO/SO #: 726876.37

ANALYSIS REQUESTED: TPH 418.1; BTEX 8020A; PAH 8310; VPH/EPH

Lab use only
Due Date:
Temp. of coolers when received (C°): 1 2 3 4 5
Custody Seal N / Y
Intact N / Y
Screened For Radioactivity ☐

Sampler's Name: JOHN MASTRACCHIO
Sampler's Signature: John Mastracchio

Proj. No.: 726876
Project Name: WESTOVER-MTF
No./Type of Containers[2]

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	A/G 1 Lt.	250 ml	P/O	TPH 418.1	BTEX 8020A	PAH 8310	VPH/EPH	Lab Sample ID (Lab Use Only)
S	5/19	1252		X	WEMTF-B3-31	[redacted]		X		X	X	X		
S	5/19	1315		X	WEMTF-B3-35			X		X	X	X		
S	5/20	0850		X	WEMTF-B2-29	X		X		X	X	X	X	
S	5/20	0919		X	WEMTF-B2-37			X		X	X	X		
S	5/20	0920		X	WEMTF-B2-37D			X		X	X	X		
S	5/20	1045		X	WEMTF-B1-15			X		X	X	X		
S	5/20	1105		X	WEMTF B1-21	X		X		X	X	X	X	
S	5/20	1430		X	WEMTF-BAK	X		X		X			X	

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
John Mastracchio	5/21/97	1806	FED EX		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date: 5/21/97	Time: 0930

Remarks: AIR BILL # 423494594 5

Client's delivery of samples constitutes acceptance of Inchcape/ITS-Dallas terms and conditions contained in the Price Schedule.

[1] Matrix: WW - Wastewater; W - Water; S - Soil; SD - Solid; L - Liquid; A - Air Bag; C - Charcoal tube; SL - Sludge; O - Oil
[2] Container: VOA - 40 ml vial; A/G - Amber / Or Glass 1 Liter; 250 ml - Glass wide mouth; P/O - Plastic or other _____

Inchcape cannot accept verbal changes. Please Fax written changes to 972-238-5592

OFFICE USE ONLY

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Laura Peña	Laura Peña
Telephone 210-536-1431	*(For DTIC Use Only)* AQ Number M01-03-0533